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Network Control Center (NCC) Operations Plan (NOP), 1998

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Preface

This Network Control Center (NCC) Operations Plan (NOP), 1998, 530-NOP-NCCDS/1998, provides information for the NCC Standard Operating Procedures, Logistics Operating Procedures, Maintenance Procedures, Console Study, and the NCC Operations Control Room (OCR) Facilities Plan. The NOP is based on the operational requirements defined in the *Network Control Center Data System (NCCDS) System Requirements, 1998,* 530-SRD-NCCDS/1998, and on the *Network Control Center Data System (NCCDS) System Design Specification, 1998*, 530-SDS-NCCDS/1998. It embodies the results of requirements analyses and study activities including prototype tests conducted with the system users and represents a consensus of NCCDS development and operation teams to ensure that all operational issues and the effects of NCCDS 98 on the existing operating procedures have been examined. The NOP provides information needed to prescribe the activities performed by the NCC 1998 era operational personnel.

The NOP is considered to be a living document and is updated as the NCCDS 98 components are developed. Updates will contain new information, will reflect changes to existing information, and will remove references to obsolete information.

This operations plan has been developed in accordance with the *Mission Operations and Data Systems Directorate System Management Policy*, 500-SMP, March 1993, and the *NCCDS Baseline Project Plan*, Revision 2, STDN No. 907, April 1988, which documents the Networks Division's approach for the implementation of improved NCC capabilities.

Information presented herein was prepared by the Network Control Center Project Office, Code 530.5, Goddard Space Flight Center (GSFC). Any questions, recommended changes, or comments should be directed to:

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Abstract

The Network Control Center (NCC) Operations Plan (NOP), 1998, 530-NOP-NCCDS/1998, specifies the allocation of functional requirements to the NCC 1998 operators, defines the roles covered by the operators and describes the interaction between operator and NCC 1998 computing systems with special emphasis on the NCCDS 1998 capabilities. It describes how the operational tasks will be performed with the support of the NCC software systems.

Keyword: *Network Control Center, Network Control Center Data System, CCS, SPSR, Interfaces, Requirements, Specification, Operations.*

Contents

Preface

Abstract

Section 1. Introduction

Section 2. NCC 98 Environment

Section 3. NCC 98 Operational Description

Section 4. NCC 98 Operator Activities

Abbreviations and Acronyms

APPENDIX A.   Description of Baseline NCC Operational Positions

APPENDIX B.   Definition of NCC 98 Operational Roles

APPENDIX C.   NCCDS 98 Operational Groups

Section 1. Introduction

1.1 Context

The Spaceflight Tracking and Data Network (STDN) is a complex communications network encompassing the Space Network (SN), Ground Network (GN), and all support facilities necessary to provide tracking, telemetry, and command (TT&C) support to customers. The STDN uses the geosynchronous Tracking and Data Relay Satellites (TDRSs), the ground terminals at the White Sands Complex (WSC), and the GN for supporting orbiting spacecraft and other missions (e.g., scientific research aircraft and balloons).

The Network Control Center (NCC) is the STDN element responsible for overall, real-time coordination of network resources to satisfy the support requirements of all network customers. From a customer's perspective, the NCC is the operational interface for obtaining mission support. From a network element's perspective, the NCC is responsible for providing work schedules and coordinating problem resolution.

1.2 Purpose of Document

The purpose of the NCC Operations Plan (NOP) is to ensure that NCC operational personnel are aware of the effects on the current procedures due to the Network Control Center Data System (NCCDS) 1998 enhancements and that all resulting operational issues have been examined by the development team. It is anticipated that the NOP will be used as input for developing NCC 1998 era User Guides, Standard Operating Procedures, Logistics Operations Procedures, Maintenance Procedures, Operations Control Room Facilities Plan and the Console Study.

The scope of the NOP covers NCC 1998 operations with emphasis on NCCDS 98. Operational interactions between NCCDS and other NCC elements involved with SN are included. The NOP documents the NCCDS 98 from an operational task perspective as seen by a NCCDS 98 development point of view. The NOP avoids detailed descriptions of operational scenarios. The NOP does not specify the of NCC 98 Operational Positions and does not overlap the Console Operators Users Guides.

The NOP considers a functional approach to operation description rather than a strict specification of operational procedures. Specifically, it provides:

a. A short system description of NCC functions, with emphases on NCCDS 98.

b. A description of operator roles and tasks and their interaction with NCCDS 98 and other NCC subsystem/segments.

c. A discussion of failover approaches and the roles of the NCC Auxiliary Operational Suite (ANCC).

Operator activities for operational roles related to the NCCDS 1998 enhancements are discussed in detail.

1.3 Reference Documents

1.3.1 Applicable Documents

The following documents are applicable to the NOP. In general, revision numbers are not indicated and the most recently available version of each document should be used.

a. *Network Control Center Data System Project Management Plan*, *1998,* 530-PMP-NCCDS/1998

b. *Network Control Center Data System (NCCDS) Operations Concept, 1998*, 530-OCD-NCCDS/1998 (June 1996, Draft)

c. *Network Control Center Data System (NCCDS) System Requirements*, 1998, 530-SRD-NCCDS/1998, October 1996

d. *Network Control Center Data System (NCCDS) System Design Specification, 1998,* 530-SDS-NCCDS/1998 (April 1996, Draft)

e. *Mission Operations and Data Systems Directorate (MO&DSD) Continuing Security Compliance Management Plan*, 500-916, Revision 4

f. *Mission Operations and Data Systems Directorate Systems Management Policy*, 500-SMP

1.3.2 Information Documents

a. *Network Control Center (NCC) Standard Operating Procedures*, 530-SOP-NCC/V1, and 530-SOP-NCC/V2

b. *Network Control Center 98 (NCC 98) Communications Control Segment (CCS) Build 1 Critical Design (CDR),* February 15, 1996

c. *NCCDS Service Planning Segment Replacement (SPSR) Critical Design Review (CDR),* February 22, 1996

d. *Network Control Center Data System (NCCDS) Service Planning Segment Replacement (SPSR) Build 1 User's Guide*, Draft, October 1996

e. *Network Control Center Data System (NCCDS) Communication and Control Segment (CCS) User's Guide*, [in preparation]

f. *Network Control Center Data System (NCCDS) Security Policy,* August 1996

g. *Network Control Center Operation Control Room (OCR) 1998 Console Study,* May 1996

1.4 Document Organization

The remaining sections of this document are arranged as follows: Section 2 discusses the NCC 98 environment. Section 3 provides NCC 98 operational description. Section 4 presents an overview of NCC 98 operator activities including failover. Appendixes provide details for the definition of Operational Roles, NCC 98 Groups, and operator activities.

Section 2. NCC 98 Environment

2.1 Description of NCC 98

The NCC is a complex, integrated entity encompassing several data systems, operations personnel, and communication interfaces. NASA Communications (Nascom) Integrated Services Network (NISN) provides the communication links connecting the NCC with STDN customers, the Sensor Data Processing Facility (SDPF), the FDF, the WSC, GN elements. It also connects NCC with Nascom Operation Center (NOC) server, Nascom Domain Name Server, and NISN Event Scheduling Terminal (NEST).

The central element of the NCC is the NCCDS whose role is to schedule, control, and monitor SN resources.

In addition to the NCCDS, other hardware and software components within the NCC include the following:

a. Multi-Mission Display Processing System (MMDPS) monitors and displays selected operational data parameters via closed-circuit television (CCTV).

b. CCTV provides for distribution of video displays including shuttle TV throughout the NCC.

c. Cryptographic devices encode and decode sensitive data on transmission and receipt.

d. The Development, Test, and Training (DT&T) facility provides a set of capabilities that effectively duplicate the operational NCCDS without its redundant hardware. The primary purpose of the DT&T is to facilitate the testing of new software, systems, and procedures. It is also used to train NCC personnel and serves as a backup to the operational system. An important feature of the DT&T is the ability to establish communication links with external entities allowing test personnel to conduct Engineering Interface (EIF) tests without affecting operations.

e. The NCC Test System (NTS) is a key element of the DT&T used to simulate external NCC interfaces. The NTS also emulates the NCCDS for the purpose of initial EIF testing.

f. The NCC Timing Display System (NTDS) provides a variety of timing displays, such as countdown clocks, that can be synchronized with remote locations.

g. The voice system provides communications between all elements.

h. The GSFC Timing System provides Coordinated Universal Time (UTC) that is used as a synchronized timing signal for NCC systems.

i. The Ground Network Scheduling System (GNSS) schedules GN services independent of TDRSS.

j.   The Electrospace Systems, Inc. telephone system provides the primary capability for NCC voice communications.

k.   The Voice Distribution System (VDS) provides the backup capability for NCC voice communications.

l.   The Mission Operations Support Area (MOSA) Data System provides the capability for monitoring the performance of GN services, as well as detecting and resolving their faults. The MOSA also supports Space Transportation System (STS) missions.

2.2 NCCDS 98 System Overview

The NCCDS schedules, controls, and monitors the SN resources. The NCCDS receives and validates customer service requests, generates and maintains the schedule, and disseminates the schedule to the appropriate SN elements and customers. The NCCDS receives acquisition data from the Flight Dynamics Facility (FDF) and SN customers, stores the data, and disseminates acquisition data to the WSC. The NCCDS handles real-time support functions including service control and service assurance, performs service accounting functions, and identifies potential radio frequency interference (RFI).

The NCCDS 98 begins operations in 1998 in an era in which the SN serves a mixture of customers, including some legacy customers who began operations as long as 15 years earlier and others whose development is contemporaneous with that of NCCDS 98. NCCDS 98 is designed to serve such a mixture of customers. This includes providing its full capability to any customer that implements the full set of 1998-era customer messages while minimizing or completely eliminating impact on legacy customers. In particular, full backward compatibility with baseline message formats is provided.

Figure 2-1 provides the current architecture design of NCCDS 98 and shows the major interfaces with external entities. Figure 2-1 shows the MMDPS inside the NCCDS 98 boundaries because MMDPS, which is not part of the NCCDS 98, obtains messages from the MEGA-MUX. It also indicates other components that are outside the NCCDS 98 operational environment.

The following NCCDS 98 components are the main factors affecting Operational Functions and operator activities that are new for NCC 98:

a.   SPSR Server replaces the baseline SPS hardware and software and provides centralized database services.

b.   CCS implements new operator interfaces and accesses the NCC database which resides on SPSR.

c.   SAS accesses the NCC database resident on SPSR.

d.   ACRS/TLAS resides on the Operator Console Workstations.

e.   The new communication elements: Firewall, Key Distribution Center (KDC), World Wide Web (WWW) and File Transfer Protocol (FTP) server, Small Conversion Device

(SCD) and NCC Protocol Gateway (NPG), support message and data exchange between external sites and internal processes.

f. Network and System Management (NSM) monitors and controls health and status of the NCCDS 98 software and hardware components

g. NCC Central Delogger (NCD) allows extraction and review of relevant data from log files. It is not shown in Figure 2-1 because it will be allocated on the NSM server or other specialized server.

h. Workstations provide the NCC 98 operators with the means for accessing the NCCDS 98 processes.

The following paragraphs describe the functions of the NCCDS 98 components.
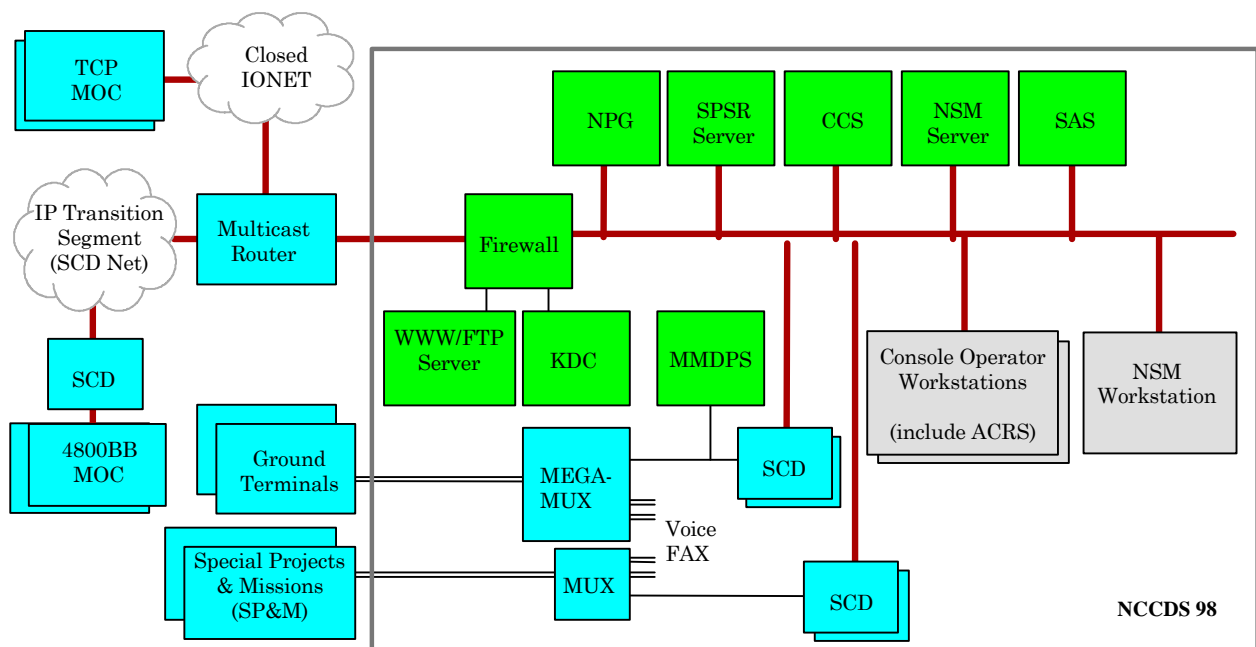

Figure 2-1. NCCDS 98 Architecture

2.2.1 Scheduling, Acquisition Data Handling, and Data Storage

The SPSR receives and validates customer service requests for SN resources, generates and maintains the resource schedule, and disseminates the schedule to the appropriate SN elements and customers. It also receives acquisition data and maintains and disseminates acquisition data

that the WSC uses for TDRS antenna pointing and Doppler shift prediction and compensation. The SPSR maintains a database of information relevant to TDRSS services, customer spacecraft characteristics, SN customer characteristics, WSC resources, and the NCC operators for use by all NCCDS components.

2.2.2 Control and Monitoring

The CCS supports functions that are critical for supporting ongoing services, such as service reconfiguration, and receipt, validation, display, and dissemination of SN performance data. These functions rely on the SPSR-maintained database.

2.2.3 Service Accounting

The SAS provides after-the-fact accounting reports on the use of Space Network resources. This capability relies on information that can be extracted from the SPSR-maintained database and on messages from WSC.

2.2.4 Identifying RFI

The ACRS identifies potential RFI among SN supported spacecrafts and highlights possible interference from known ground-based RF sources. This capability relies on information that can be extracted from the SPSR-maintained database. The ACRS software resides on the NCCDS 98 Workstations.

2.2.5 NCCDS 98 Communication

The NCCDS 98 internal interfaces are based on TCP/IP and UDP/IP protocols and use the Operational Local Area Network (Ops LAN) for local communication. The NCCDS 98 external interfaces with some of the customers are based on Nascom TCP/IP protocols. The NCCDS 98 allows legacy customers to continue using Nascom 4800 BB protocol. The Firewall and the KDC control the security aspects of the external interfaces. The WWW server provides customer's access to the TDRSS Unscheduled Time (TUT) web site, and the FTP server supports direct transfer of acquisition data file from FDF. The MUXs and SCD support the external interfaces with ground terminals and Special Projects & Missions which use dedicated links. The NPG provides client/server proxy capabilities between the external elements and NCCDS 98 processes.

2.2.6 Network & System Management

The NSM monitors performance, health, and status of the NCCDS 98 computer systems and processes and of the Ops LAN. Monitoring is automatically performed from a central server via distributed software agents and probes. The NSM informs NCC 98 operators of the occurrence of anomalous situations. NSM also supports the start-up, shut-down, backup, and recovery for NCCDS components (except CCS VAX) and controls the Ops LAN configuration.

2.2.7 NCC Central Delogger

The NCD provides efficient methods for selecting and extracting relevant data collected in log files created by SPSR, CCS, and NPG. It uses log files stored in disk or archived on tape. It allows NCC 98 Operators to apply filter criteria to the log files records (e.g., log time, message source/destination, customer, service) and review the specified data.

2.2.8 NCCDS 98 Workstations

The NCCDS 98 is designed to allow any authorized NCC 98 operator to access the NCCDS 98 functions from any NCCDS 98 Workstation. Each NCC 98 console has two monitors, with one virtual display, connected to one workstation which is connected to the Ops LAN. The NCCDS 98 Workstations provide operator interfaces via Graphical User Interfaces (GUIs). This enables NCC operators to create forecast and active period schedules for SN services, handle acquisition data, and supervise SN service control and service assurance functions from any NCC 98 console. NCCDS 98 Workstations include the ACRS software and GUI that support RFI functions.

Operator access to specific NCCDS 98 resources, which depends on operator roles, is directly controlled via a set of pre-assigned privileges. Specific NCCDS capabilities may be assigned and de-assigned to individual operators as operational conditions warrant. A highly privileged operator assigns operational privileges to individual operators.

2.3 NCC 98 Equipment Suites

The NCC 98 operations will be partitioned in three equipment suites to provide a static operational configuration. Figure 2-2 shows a conceptual representation of the equipment suites.

The Primary Operational Suite (Operational Suite for short) provides the nominal NCCDS operational capabilities. All components are redundant to meet the availability requirements. The Operational Suite operates at sensitivity criticality level 3.

The Auxiliary Operational Suite (ANCC) is used when the Operational Suite is unavailable for planned or unplanned circumstances. It provides full operational capabilities with non redundant components. The ANCC operates at sensitivity criticality level 3.

The DT&T Suite (DT&T) is used for development, test, and training and for EIF tests. The DT&T operates at sensitivity criticality level 1 and is never used operationally. Data transfer to and from the other suites is initiated and controlled by the Firewall manager located in the other suites.
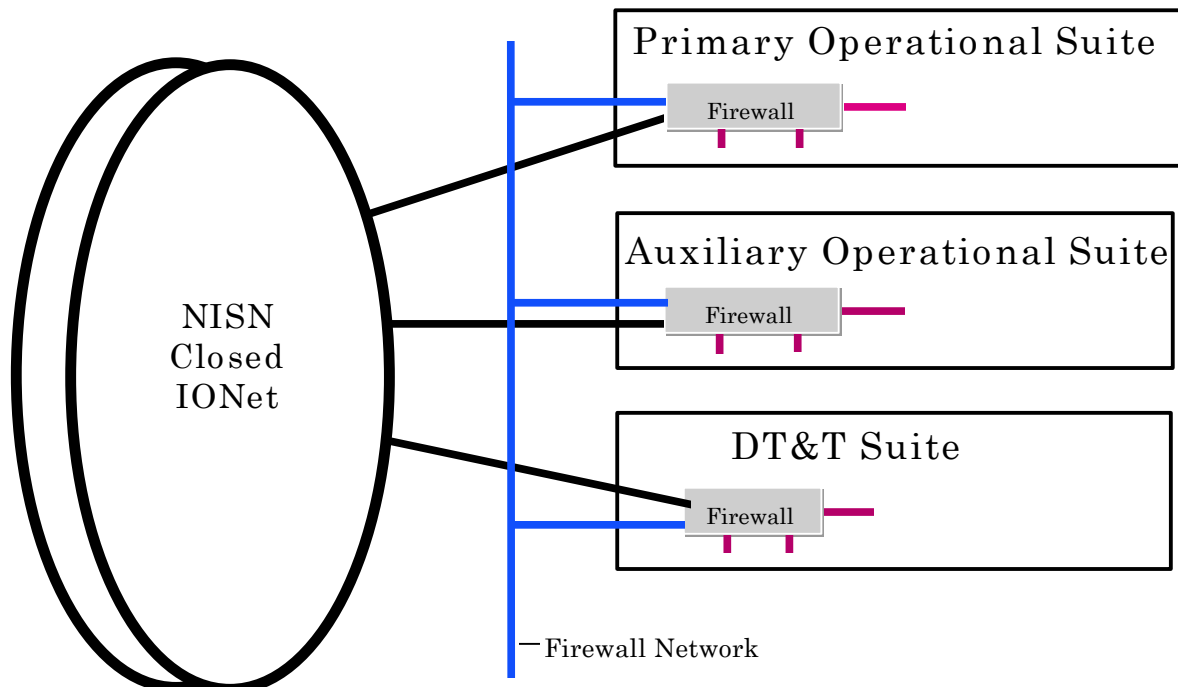
Figure 2-2. NCC 98 Equipment Suites Concept

The static operational configuration removes the need to update external name resolution tables dynamically. It also reduces the complexity of NCCDS LAN development and operations and provides control of the communication between the DT&T systems, which has sensitivity criticality level 1, and the operational systems, which have sensitivity criticality level 3.

2.4 Operational Environment

The NCCDS 98 exchanges message traffic with external entities to support its operational activities, which include scheduling SN resource usage, processing acquisition data, SN service control, and service assurance.

The NCCDS 98 supports all operations of the baseline NCCDS with enhanced flexibility to the customers, increased functionality and effectiveness, and improved operator control over processing. The operational emphasis of the NCCDS 98 is on activities that require highly effective processing of schedules and acquisition data. Under routine conditions, the NCCDS 98 processes operate automatically with continuous operator oversight and after initiation by the operator. If necessary, the operator can override any automated operational activities and process them manually.

The NCCDS operates 24 hours per day seven days a week. Automated activities (such as processing of active period schedule requests) are handled at any time. Operator-controlled

activities (such as generating the weekly SN schedule or resolving conflicts) are normally carried out during the daytime shift.

Hardware maintenance is performed using NCC logistical resources and personnel assigned to the Building 13 complex. Software maintenance is provided using the capabilities of the DT&T facility located at the NCC. The development environment for the NCCDS 98 software is located at the SPSR Development Environment (SDE) in Building 13, the Software Engineering Research Facility (SERF) in Building 12, and the Software Development Facility (SDF) in Greentec I.

2.5 OCR 98 Operator Console

The NCC 98 operators located in the NCC 98 Operations Control Room (OCR 98) perform their tasks from an operator console (i.e., operator working area). The OCR 98 operator console is described in the OCR Console Study.

The operator console consists of a 78 by 32 inches steel table with reading lamps, shelf space, and drawers. The console has electric power outlets and a dedicated circuit breaker. On the console table-top reside the components used by the operators to interface with the NCC 98 electronic equipment and a computer-based telephone set which provide access to both secure and unsecured lines.

The new element for the OCR 98 is the NCCDS 98 Workstation. Figure 2-3 is a simplified representation of the interaction of the NCCDS 98 Workstation with the CCTV which is used to obtain information from other NCC 98 components.

The NCCDS 98 Workstation includes keyboard and mouse as input devices, two monitors (left and right) acting as one virtual display, and video channel cards to interfaces the workstation with the CCTV distribution complex. The operator can electronically select CCTV channels which are then displayed in one or more of the NCCDS 98 Workstation windows.

The workstation transfers to the CCTV the images displayed on the monitors' windows for distribution to other operator consoles connected to the CCTV.

Some of the operator consoles may have, in addition or in place of the NCCDS 98 Workstation, other components such as the following:

    a.   keyboard to control the MMDPS (displays are on the monitor via CCTV)

    b.   keyboard, mouse, and monitors of the GNSS processor (also connected with the CCTV) used by the operators that perform Ground Network scheduling

    c.   Flight Pattern Terminal (FPT)

    d.   keyboard and printer of the Shuttle Antenna Management System (SAMS) with displays through the CCTV

    e.   printers of the Automated Message Distribution System (AMDS) used by the GNSS to distribute messages to the NCC operators

f. MacIntosh, keyboard, mouse, and monitor for connection with the GSFC Center Network Environment (CNE).

These components provide interfaces with other NCC 98 computer systems.
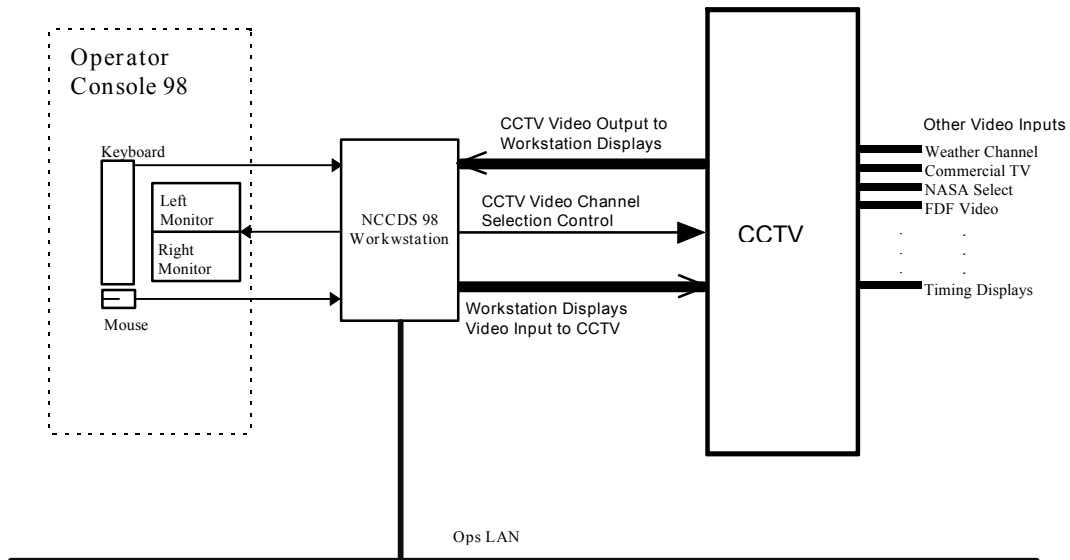

Figure 2-3. Operator Console 98

Section 3. NCC 98 Operational Description

3.1 Introduction

Section 3 discusses the NCC 98 Operations from the view point of the NCC 98 functions allocated to the operators (i.e., Operational Functions), of the roles performed by the operators (i.e., Operational Roles) and the means available to the operators for accessing the NCCDS 98 operational support in performing their roles (i.e., NCCDS 98 Groups).

The definition of NCC 98 Operational Roles and NCCDS 98 Groups is based on the following flow of information:

  a.   Identify operator activities and specify NCC 98 Operational Functions.

  b.   Specify Operational Tasks for each Operational Function.

  c.   Define sets of Operational Tasks.

  d.   Define the NCC 98 Operational Roles by allocating one or more of these sets of Operational Tasks to a class of operators or operator teams.

  e.   Identify the NCCDS 98 software functions that support each Operational Role

  f.   Define the NCCDS 98 Groups.

The *NCCDS System Requirements, 1998,* October, 1996 Document (SRD) is the main input for identifying operator activities and specifying the Operational Functions. The NCC Standard Operating Procedures, November 1995, 532-SOP-NCC/V1 (SOP) defines the Baseline NCC Operational Positions and is used as a reference guideline for grouping the Operational Tasks. The design documentation of other NCCDS 98 components (i.e., NSM, NPG, Firewall, and KDC) provides the definition of additional NCCDS 98 Operations Roles and are also used, together with NCCDS 1998 System Design Specification and the CCS and SPSR Design Reviews, to identify the functional support to each Operational Role. CCS and SPSR Design Reviews and minutes from working groups are used to define the NCCDS 98 Groups.

3.2 Baseline NCC Operational Positions

The Baseline NCC Operational Positions are used as a reference in defining NCC 98 Operational Roles because of the similarity between baseline and NCC 98 operations. Table 3-1 lists the Baseline NCC Operational Positions as described in Section 2 of the SOP.

The SOP provides the following meanings to the definitions of the column headings: Operation Console Positions are responsible for the SN scheduling and monitoring and for the NCC operations; Mission-unique Positions are responsible for solving problems related to specific missions; and NCC Support Positions are responsible for the NCC security control,

administrative management, and facilities maintenance. More details of the Baseline NCC Operational Positions are in Appendix A.

Table 3-1. Baseline NCC Operational Position

Operation Console Positions	Mission-unique Positions	NCC Support Positions
Network Manager (NM)	Network Director (ND)	COMSEC Custodian
Technical Manager (TM)	STDN Mission Manager (SMM)	Crypto Coordinator (CC)
Performance Analyst (PA)	Network Operations Managers (NOM)	Security Administrative Controller (SAC)
East PA - assigned to TDE support	Space Network Operations Manager	Data Base Manager (DBM)
West PA - assigned to TDW support	(SNOM)	Data Base Administrator (DBA)
and TDRS-Spare support	Ground Network Operations Manager	NCC Scheduling
Acquisition/Tracking Controller (AT)	(GNOM)	Parameter Control (PC)
Schedule Forecasting Analyst (FA)	Mission Support Manager (MSM)	Network Reporting (NR)
Real-time Scheduling Operator (SO)	TDRSS Network Analyst (TNA)	Ground Network Scheduling Operator (GNSO)
Security Watch Officer (SWO)	Network Engineering Support Team (NEST)	System Engineer (SE)
Operations Engineer (OE)	Command (CMD)	Maintenance and Operations (M&O)
Communication Specialist (CS)	Telemetry (TLM)	Logistics (LOG)
	Data	NCC Communication Center
	Air-to-Ground/Ground-to-Air (A/G)	Ground Communication Coordinator (GCC)
	communications	NCC Communication Specialist (CS)
	Tracking Systems (TRACK)	NCC Documentation (DOC)
	ND Report Team	Media Controller (MC)

The NCC 98 Operational Positions are expected to be different from the baseline ones because some positions may be consolidated due to improved computational support and some may be eliminated due to changes in security requirements. Definition of NCC 98 Operational Positions is outside the scope of this document.

3.3 NCC 98 Operational Functions and Operational Roles

Operational Roles are coherent sets of tasks and responsibilities assigned to a class of NCC 98 operators. For example, an operator responsible for the SN Performance Monitoring role performs such tasks as SN monitoring and SN performance data dissemination control. One operator may have several Operational Roles or the same Operational Role may be assigned to several operators depending on the organization of NCC 98 Operations and on workload and available personnel. For example, the Acquisition Tracking Data Controller role and the SN Performance Monitoring role may be assigned to the same operator; the SN Performance Monitoring role may be split between several operators for different TDRSs. The purpose of

defining Operational Roles is to provide a framework for the definition of NCCDS 98 Groups and for the description of operator activities from a perspective close to NCC 98 operations.

Although the NCC 98 Operational Roles are analogous to the Baseline NCC Operational Positions, to emphasize the differences in content the Operational Roles names are different from those of the analogous Baseline NCC Operational Positions. Also, the NCC 98 Operational Roles definition includes only those which are directly or indirectly derivable from the SRD and for which the SRD specifies functional requirements. Other Operational Roles which are not derivable from the SRD (e.g., Operation Management roles) are included as place holders for definitions to be derived from NCC 98 Operation Positions.

Section 3.3.1 provides an outline of the NCC 98 Operational Functions. Section 3.3.2 summarizes the NCC 98 Operational Roles definition with a mapping to Operational Functions and, for reference, to analogous Baseline NCC Operational Positions. Appendix B provides detailed definition of NCC 98 Operational Roles. It specifies Operational Tasks and Operational Functions, allocates tasks and functions to each NCC 98 Operational Role, and indicates what support is provided by the NCC 98 capabilities to the roles.

3.3.1 NCC 98 Operational Function Specifications

The NCC 98 Operational Functions are the components allocated to operators of the NCC 98 system functions which are specified in the SRD. This specification follows the organization of NCC 98 main system functions as indicated in Section 4 of the SRD:

    a.   Service planning (details in SRD Section 5)

    b.   Service control (details in SRD Section 6)

    c.   Service assurance (details in SRD Section 7)

    d.   Service accounting (details in SRD Section 8)

    e.   System operation (details in SRD Section 9)

    f.   System security (details in SRD Section 10)

Most of the operational functions are based on exception control and may involve direct communication (via phone, fax, CNE) between NCC operators and customers, or with operators of other entities external to the NCC.

Paragraphs 3.3.1.1 through 3.3.1.6 list the Operational Functions that are allocated to NCC 98 operators for each main system function. Further details, including the specification of Operational Tasks, are in Appendix B.

3.3.1.1 Service Planning

The NCC 98 service planning function generates a conflict-free schedule for use of SN resources based on requests for support, TDRS Scheduling Window (TSW) specifications, and availability of resources. The schedule is adjusted on the basis of new customer requests, changes in

network status, and revision of TSWs. The following service planning Operational Functions are allocated to NCC 98 operators:

    a.   Maintain the service planning database;

    b.   Interact with schedule related messages used for service scheduling, such as: schedule requests submitted by the customer or entered by the operator (i.e., SARs, Alternate SARs, Replace requests, Wait list requests, SDRs, GT requests (GAM), etc.), TSWs, and SLRs;

    c.   Control the scheduling process;

    d.   Control TUT generation.

Controlling schedule transmission is part of the NCC 98 service control function described in paragraph 3.3.1.2.

The service planning database is initially populated with the contents of the Baseline NCC legacy database and is, then, updated according to NCC 98 procedures and validation rules. The operators involved with the scheduling messages and process functions may update the scheduling parameter database, edit and delete customer requests, and may directly communicate (via phone, fax, CNE) with customers and with operators of other entities external to the NCC. They may perform manual intervention in response to action alerts. The TUT generation function is normally performed automatically.

3.3.1.2 Service Control

The NCC 98 service control function controls the use of SN resources. The following service control Operational Functions are allocated to NCC 98 operators:

    a.   Control dissemination of service schedules and updates;

    b.   Control reception, storage, and dissemination of acquisition data and generate and transmit Delta-T messages;

    c.   Control service reconfiguration requests;

    d.   Control SN performance data dissemination to customers;

    e.   Exchange free text administrative messages with operators at WSC and other facilities.

The NCC 98 service control functions are normally performed in automatic or semi-automatic mode by the NCCDS 98. The main operator tasks are to set up control parameters and to perform manual intervention in response to action alerts. The operator may interact with SN support elements on an as-needed basis. Operational functions are supported by the Administrative Message capability provided by NCCDS to exchange free-text administrative messages with operators at WSC and other facilities.

3.3.1.3 Service Assurance

The NCC 98 service assurance function ensures the quality of SN-provided services by monitoring and evaluating SN performance data and determining any actions required to resolve anomalies. The following service assurance Operational Functions are allocated to NCC 98 operators:

    a.   Perform network monitoring and identify anomalous conditions;

    b.   Perform post-event problem analysis;

    c.   Evaluate RFI and mutual interference prediction.

Network monitoring is performed automatically by the NCCDS 98 with displays to the operator. Processing post-event messages (i.e., Return Channel Time Delay Measurement messages and Time Transfer messages) is performed automatically by the NCCDS 98 without any operator intervention. RFI and mutual interference predictions are computed automatically by the NCCDS 98 under control of the operator. The main operator tasks are to set up control parameters and to perform manual intervention in response to anomalous conditions, to identified anomalies, or in other exceptional cases as defined by NCC 98 operational procedures. The operator may interact with SN customers on an as needed basis.

3.3.1.4 Service Accounting

The NCC 98 service accounting function provides information on quantity and quality of services provided to SN customers, on the effectiveness of network utilization, and on internal NCCDS performance. The following service accounting Operational Functions are allocated to NCC 98 operators:

    a.   Review historical log content;

    b.   Define reports and review report generation parameters;

    c.   Modify and delete pre-defined reports;

    d.   Specify report generation time intervals;

    e.   Select reports for generation.

The service accounting function performs automatic data collection. The operator controls report generation and reviews the generated reports.

3.3.1.5 System Operation

The NCC 98 system operation function controls the NCC 98 operations and the interaction of personnel, hardware and software. The following system operations Operational Functions are allocated to NCC 98 operators:

a. Assign to NCC 98 operators the privileges for accessing NCCDS 98 system resources (e.g., establish NCCDS 98 Groups for CCS and SPSR, allocate NCC 98 Operators to NCCDS 98 Groups);

a. Access NCCDS 98 system resources:

1   Perform Log-on and activate the Operator-System interface,

2   De-activate the Operator-System interface and perform Log-off;

b. Define NCC Hardware, Software, and Network configurations;

c. Configure interfaces with external sites (i.e., NPG tables);

d. Manage NCCDS 98 data archiving and back-up;

e. Manage NCC performance (workloads and response times);

f. Manage NCC Hardware, Software, and Network configurations in response to performance or availability problems;

g. Manage NCC failure recovery;

h. Manage NCCDS Development, Testing, and Training.

Most of the functions related to NCC 98 System Operations are performed automatically under operator monitoring and control.

3.3.1.6 System Security

The NCC 98 system security function protects and controls access to the NCC 98 data and functional resources (NCC 98 does not handle classified data and operates at the AIS/SC 3 level). The following system security Operational Functions are allocated to NCC 98 operators:

a. Administer automated access controls that limit access to NCC 98 resources and data through messages exchanged with external sites;

b. Administer the control of security services applied to messages exchanged between NCC 98 and external sites;

c. Administer mechanisms designed to limit communications between NCC 98 resources and external entities to authorized end-points and protocols.

d. Control and review message and operator action security audit logs;

Most of the functions related to NCC 98 System Security are performed automatically under operator monitoring and control.

3.3.2 Definition of NCC 98 Operational Roles

Table 3-2 provides a summary of NCC 98 Operational Roles. The Table also includes, as place holders, entries for NCC 98 Operational Roles that are not derived from the SRD and for which functional requirements are not specified.

Table 3-2 includes, for reference, a possible mapping of NCC 98 Operational Roles to Baseline NCC Operational Positions as defined by the SOP. The mapping does not provide a one-to-one correlation between NCC 98 Operational Roles and Baseline NCC Operational Positions. For example, the NCC Scheduling positions do not correlate with the Operational Functions allocated to the SN Scheduling Analyst Operational Role. The assignment of NCC 98 Operational Roles to NCC 98 Operational Positions is outside the scope of this document.

Table 3-2 includes two columns:

1. The NCC 98 Operational Roles column contains Operational Role names and lists NCC 98 Operational Functions allocated to that role. Also included is a reference (in brackets) to Section 3.3.1 where the Operational Function is specified.

2. The Baseline NCC Operational Positions column contains Operational Position name, call symbol (in parenthesis), and a reference (in brackets) to the SOP Volume 1 Section number where the position is described.

The Operational Function "Access NCCDS 98 system resources" (see Section 3.3.1.5 (b)), is part of each Operational Role supported by the NCCDS 98 and is not listed for any role in the Table.

Appendix B provides detailed definition of NCC 98 Operational Roles. It includes specifications of Operational Tasks for each Operational Function allocated to each NCC 98 Operational Role and indicates what support is provided by the NCC 98 capabilities to the roles.

Table 3-2. NCC 98 Operational Roles (Summary)

NCC 98 Operational Roles [Section 3.3.1 Reference]	Baseline NCC Operational Positions [SOP-Volume 1 Section Number]
SN Performance Monitoring [3.3.1.2 d] Control SN performance data dissemination to customers. [3.3.1.3 a] Perform network monitoring and identify anomalous conditions. [3.3.1.3 b] Perform post-event problem analysis.	Performance Analyst (PA) [SOP-V1 2.3.4] • West Performance Analyst • East Performance Analyst
SN Performance Support [3.3.1.3 c] Evaluate RFI and mutual interference prediction	
SN Controller [3.3.1.2 c] Control service reconfiguration requests.	

Table 3-2. NCC 98 Operational Roles (Summary)

NCC 98 Operational Roles [Section 3.3.1 Reference]	Baseline NCC Operational Positions [SOP-Volume 1 Section Number]
Acquisition and Tracking Controller [3.3.1.2 b] Control reception, storage, and dissemination of acquisition data; generate and transmit Delta-T messages.	Acquisition/Tracking Controller (AT) [SOP-V1 2.3.5]
SN Scheduling Analyst [3.3.1.1 b] Interact with schedule related messages. [3.3.1.1 c] Control the scheduling process. [3.3.1.1 d] Control TUT generation. [3.3.1.2 a] Control dissemination of service schedules and updates.	NCC Scheduling [SOP-V1 2.4.7] • Scheduling Operator (SO) [SOP-V1 2.3.7] • Forecast Analyst (FA) [SOP-V1 2.3.6] • Parameter Control (PC) [SOP-V1 2.4.8]
Space Network Activity Reporting [3.3.1.4 b] Define reports and report generation parameters.	• Network Reporting (NR) [SOP-V1 2.4.10]
Service Planning Database Analyst [3.3.1.1 a] Maintain the service planning database.	Data Base Manager (DBM) [SOP-V1 2.4.5] Data Base Administrator (DBA) [SOP-V1 2.4.6]
GN Scheduling Analyst Respond to GN users requests. Schedule GN resources.	Ground Network Scheduling Operator (GNSO) [SOP-V1 2.4.9]
NCC 98 Operators Authorization [3.3.1.5 a] Assign to NCC operators the privileges for accessing NCCDS 98 system resources. Define NCCDS 98 Groups	

Table 3-2. NCC 98 Operational Roles (Summary)

NCC 98 Operational Roles [Section 3.3.1 Reference]	Baseline NCC Operational Positions [SOP-Volume 1 Section Number]
NCC 98 System Management [3.3.1.5 c] Define NCC Hardware, Software, and Network configurations. [3.3.1.5 d] Manage connectivity with external sites (i.e., NPG tables). [3.3.1.5 e] Manage NCCDS 98 data archiving and databases back-up. [3.3.1.5 f]. Manage NCC performance (workloads and response times). [3.3.1.5 g] Manage NCC Hardware, Software and Network configuration in response to performance or availability problems. [3.3.1.5 h] Manage NCC failure recovery. [3.3.1.5 i] Manage NCCDS Development, Testing, and Training.	Operations Engineer (OE) [SOP-V1 2.3.9] System Engineer (SE) [SOP-V1 2.4.11] Maintenance & Operations (M&O) [SOP-V1 2.4.12] Logistics (LOG) [SOP-V1 2.4.17]
NCC 98 Security Administration [3.3.1.6 a]. Administer automated access controls that limit access to NCC 98 resources and data through messages exchanged with external sites. [3.3.1.6 b] Administer the control of security services applied to messages exchanged with external sites [3.3.1.6 c] Administer mechanisms designed to limit communications between NCC 98 resources and external entities to authorized end-points and protocols	Security Watch Officer (SWO) [SOP-V1 2.3.8] COMSEC Custodian (COMSEC) [SOP-V1 2.4.2] Crypto Coordinator (CC) [SOP-V1 2.4.3] - - - - - - - - - - - - - - - - - - Security Administrative Controller (SAC) [SOP-V1 2.4.4]
NCC 98 Security Administration (continue) [3.3.1.6 d]. Control and review message logs and operator action security audit logs	Media Controller (MC) [SOP-V1 2.4.16]
NCC 98 Management of General Administrative Messages (high speed) and Administrative Message System (fax) [Generic role to cover the management of NCC 98 administrative communications.]	NCC Communication Center (Comm Center) [SOP-V1 2.4.13] - - - - - - - - - - - - - - - - - - • Ground Communication Coordinator (GCC) [SOP-V1 2.4.14] - - - - - - - - - - - - - - - - - - • Communication Specialist (CS) [SOP-V1 2.3.10] - - - - - - - - - - - - - - - - - - NCC Documentation (DOC) [SOP-V1 2.4.15]

Table 3-2. NCC 98 Operational Roles (Summary)

NCC 98 Operational Roles [Section 3.3.1 Reference]	Baseline NCC Operational Positions [SOP-Volume 1 Section Number]

NCC 98 Operations Management
    Network Manager
    Technical Manger
[Generic role to cover the management of NCC 98 operations.]
	Network Manager (NM)
	[SOP-V1 2.3.2]

	Technical Manager (TM) [SOP-V1 2.3.3]
NCC 98 Mission Specific Operations [Generic role to cover the management of NCC 98 mission. specific operations.]	Network Director (ND) [SOP-V1 2.5.2]
	STDN Mission Manager (SMM) [SOP-V1 2.5.3]

	Network Operations Managers (NOM)
	    • Space Network Operations Manager (SNOM)
	    • Ground Network Operations Manager (GNOM)
	[SOP-V1 2.5.4]

	Mission Support Manager (MSM) [SOP-V1 2.5.5]
	TDRSS Network Analyst (TNA) [SOP-V1 2.5.6]
	Network Engineering Support Team (NEST) [SOP-V1 2.5.7]
	ND Report Team [SOP-V1 2.5.8]

3.4 Operator Groups

Operator Groups connect Operational Roles with the functional support provided by NCCDS 98 to operators. Operator Groups implement centralized means for controlling access to NCCDS 98 and limiting operator privileges to the operators that cover a specific Operational Role. An NCC 98 operator who covers more than one role is allocated to all Operator Groups that provide, in combination, the full NCCDS 98 support to the operator's activities and responsibilities.

The UNIX Operating System controls the operator's access to the NCCDS 98 functionalities by means of the UNIX Groups definition. An Operator Group is specified by the privileges defined for the UNIX Group of which the operator is a member.

The Operational Roles related to SN Operations and supported by CCS and SPSR are controlled by NCCDS 98 Groups which are an extension of the UNIX Groups. An NCCDS 98 Group includes definition of CCS and SPSR windows for which the Operator Group has editing privileges and allocates alerts to the Operator Group.

This Section provides a discussion of Operator Groups. It outlines the operator's access, directly controlled by UNIX Groups, to NCCDS 98 components other than CCS and SPSR (Section 3.4.1), illustrates NCCDS 98 Groups concepts (Section 3.4.2), defines Operational Groups by listing what access to CCS and SPSR data and functionalities is required by each Operational Role related to SN Operations (Section 3.4.3), and discusses the implementation of the NCCDS 98 Groups (Section 3.4.4). Section 3.4.5 summarizes the operator access to NCCDS 98 functionalities.

The NCC 98 Operators Authorization role has responsibility for assigning access privileges to the operators. The privileges are assigned in accord with the definition of NCC 98 Operational Positions and NCC 98 Operational Procedures.

3.4.1 Operator Access to NCCDS 98 Components other than CCS and SPSR

Privileges of operators assigned to Operational Roles related to SN Operations are controlled by means of NCCDS 98 Groups. NCC 98 operators who are assigned to other Operational Roles are members of UNIX Groups that directly specify their privileges.

The following list indicates the other Operational Roles and the functionalities used by the roles:

- SN Performance Support uses functionalities provided by ACRS/TLAS software which resides on SN Operations workstations

- SN Activity Reporting uses functionalities of SAS software which is accessed from SN Operations workstations by remote Log-on

- NCC 98 Operators Authorization uses functionalities of NSM software

- NCC 98 System Management uses functionalities of NSM software and NPG management software

- NCC 98 Security Administration uses functionalities of Firewall and KDC management software

The NSM software, the NPG management software, and the Firewall and KDC management software reside on the NSM server. Their functionalities are accessed from NSM client workstations

3.4.2 NCCDS 98 Groups Concepts

NCCDS 98 Groups connect Operational Roles related to SN Operations with the functional support provided by CCS and SPSR. These Operational Roles include functions for SN service planning, control, and assurance (see Appendix B):

- SN Performance Monitoring

- SN Controller

- Acquisition and Tracking Controller

- SN Scheduling Analyst

- Service Planning Database Analyst

Using any SN Operation workstation, an NCC 98 operator may directly access all CCS and SPSR data and functions and would receive all action alerts issued by CCS and SPSR.

The NCCDS 98 Groups implement centralized means for controlling access and limiting alert distribution. They restrict access and action alerts only to the operators that cover a specific Operational Role. An NCC 98 operator who covers more than one role supported by CCS and SPSR is allocated to all NCCDS 98 Groups that provide, in combination, the full NCCDS 98 support to the operator's activities and responsibilities.

3.4.3 Operational Groups

Operational Groups specify all privileges and alert for any operator that will be member of the groups. The definition of an Operational Group provides inputs to the implementation of NCCDS 98 Groups and is defined on the basis of Operational Roles and associated list of privileges and action alerts for an operator accessing CCS and SPSR.

The Operational Groups definition is based on analysis of the following areas as they relate to the Operational Functions of each Operational Role:

a. privileges of manipulating data (e.g., edit, update, add, store);

b. privileges of executing processes (e.g., generate schedule, activate schedule, activate transmissions) and restrictions (e.g., only review active events, only monitor transmission status);

c. allocation and boundaries of specific action alert classes.

Table 3-3 provides a summary of Operational Group preliminary definitions which are based on the Operational Roles defined in Section 3.3.2. The Table includes Operational Group name (same as the one of the corresponding Operational Role), action alerts allocated to the group, accessed data and authorized actions on the data, and process execution privileges. The first group is a place holder for those operators who are allowed to only view CCS and SPSR data.

Table 3-3. Definition of Operational Groups

Operational Group	Data Accessed	Action on Data	Execution Privileges
1. View Data No action alerts	Any CCS and SPSR data	View only	
2. Service Planning Database Analyst No action alerts	Service Planning Database • SN data, • Customer data, • NCCDS scheduling data	Edit, update, add, store	Service Planning Database content: maintenance
3. Space Network Scheduling Analyst Action alerts related to schedule message and to scheduled event dissemination	Service Planning Database content Schedule Messages (SARs, SDRs, TSWs, etc.) Service Schedules (Batch, Active) Scheduled Event Transmission Parameters (STRS)	View only; Edit, update, add, user and scheduling parameters without altering the default values Edit, update, add, store Edit, update, add, store Edit, update, add, STRS without altering the default values	Batch schedule: generation, evaluation and activation Active schedule: maintenance Schedule dissemination: selection of transmission mode, initiation and control TUT data: generation control
4. Space Network Performance Analyst Action alerts related to Space Network performance and to performance data dissemination	Service Planning Database content Active Schedule User Performance Data Requests	View only View only Edit, update, add, store	Space Network performance: monitoring and evaluation User performance data dissemination: definition, initiation and control OPM time-out value: setting

Table 3-3. Definition of Operational Groups

Operational Group	Data Accessed	Action on Data	Execution Privileges
5. Space Network Controller	Service Planning Database content	View only	Ongoing services configuration: monitoring
Action alerts related to Space Network configuration status	Active Schedule	View only	Ground Control Message Requests: validation
	Ground Control Message Requests	Edit, add, store	generation
6. Acquisition Tracking Controller	Service Planning Database content	View only	Vector validation and transmission specification of control parameters
Action alerts related to receipt of invalid vectors, vector reception status, vector transmission status, and vector rejection	Active Schedule	View only	Vector content: evaluation and update
	Vector and transmission validation control parameters (SRD 6.3.7.5)	Edit, update, add, store	Delta-T message: generation and transmission
	Vector data	Edit, update, add, store	Vector transmission: selection of transmission mode, initiation and control
	Vector Transmission Parameters (VTRS)	Edit, update, add, VTRS without altering the default values (to be confirmed)	

Appendix C contains analysis details in Tables C-1 and C-2. Table C-1 includes a preliminary identification, for each Operational Role, of all alerts sent to an operator covering that role and provides a preliminary indication of the type, action or information, of each alert: The operator should respond to the action alerts. The alert preliminary identification is obtained from the NCCDS 98 SRD. Table C-2 includes a preliminary identification of the specific support provided by CCS and SPSR to each Operational Function of each Operational Role and provides a preliminary indication of the windows that the operator uses to activate CCS and SPSR functionalities.

3.4.4 Implementation of NCCDS 98 Groups

The implementation of NCCDS 98 Groups is directly related to the implementation of the operator's interaction with CCS and SPSR and of the operators access to the system. The interaction is provided by the following GUI elements:

- A menu bar which provides selection of main CCS and SPSR functions.

- Specialized windows which provide display and response for action alerts.

- Dedicated windows which provide access to specific CCS and SPSR data and functions.

An operator accesses the system by entering name and password at a workstation log-on window. The UNIX operating system verifies the operator's authorization, opens the connections with all UNIX Groups to which the operator has been assigned, and displays the menu bar.

Each class of action alerts, stored in the SPSR database, is linked to one or more UNIX Groups. Pending alerts are automatically delivered to the workstation of the operator who belongs to those groups.

The operator opens one or more dedicated windows to access CCS and SPSR data and processes. The privileges to modify data and activate processes are automatically controlled by the entries in an Action Control List (ACL). Each entry associates a dedicated window ID with the UNIX Groups that have "Edit" privileges in that windows.

The operator who covers the NCC 98 Operator Authorization role has responsibility for specifying the NCCDS 98 Groups. The following activities are part of the specification of a NCCDS 98 Group:

    a. Identify and specify an Operational Group
       Action alerts sent to the Group
       CCS and SPSR data accessibility for the Group
       CCS and SPSR process execution privileges for the Group

    b. Create an UNIX Group
       UNIX Group name
       UNIX Group privileges
       UNIX Group associated scripts

    c. Associate action alerts of Operational Group to UNIX Group

    d. For each privilege of the Operational Group create an ACL entry which includes
       UNIX Group name
       Window ID for Operational Group "Edit" privileges

Step (a), definition of an Operational Group, specifies the requirements of the group that is then implemented with Steps (b) through (d).

The NCC 98 Operator Authorization role gives an NCC 98 operator the data access and process privileges by associating the operator with one or more NCCDS 98 Groups. This is obtained via the following steps:

    a. Specify Operator's Privileges
       Assign operator to Operational Groups (e.g., define position)
       Indicate Operational Name (e.g., position name)

    b. Create Operator's UNIX Account, which includes

Operator's UNIX ID (e.g., Operator's name)
Password for Account (controlled by the person)
Person's Name, Phone, etc.
List of UNIX Groups to which the operator belongs

Figure 3-1 illustrates the definition of NCCDS 98 Groups. The NCC 98 Operator Authorization role is supported by NSM and SPSR database functionalities.
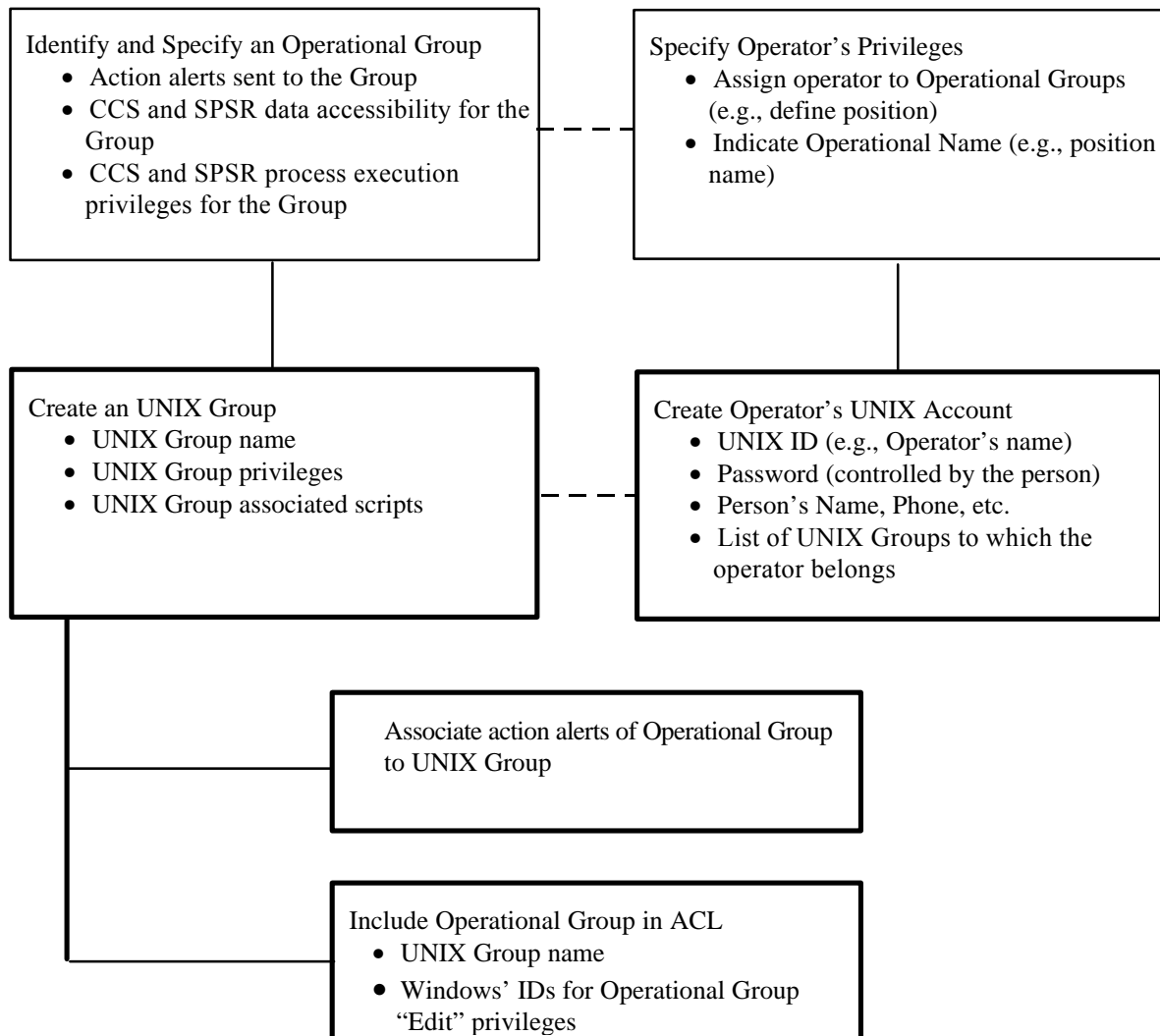
```
┌─────────────────────────────────┐      ┌─────────────────────────────────┐
│ Identify and Specify an         │      │ Specify Operator's Privileges   │
│ Operational Group               │      │  • Assign operator to           │
│  • Action alerts sent to the    │ - - -│    Operational Groups           │
│    Group                        │      │    (e.g., define position)      │
│  • CCS and SPSR data            │      │  • Indicate Operational Name    │
│    accessibility for the Group  │      │    (e.g., position name)        │
│  • CCS and SPSR process         │      │                                 │
│    execution privileges for the │      │                                 │
│    Group                        │      │                                 │
└─────────────────────────────────┘      └─────────────────────────────────┘

┌─────────────────────────────────┐      ┌─────────────────────────────────┐
│ Create an UNIX Group            │      │ Create Operator's UNIX Account  │
│  • UNIX Group name              │ - - -│  • UNIX ID (e.g., Operator's    │
│  • UNIX Group privileges        │      │    name)                        │
│  • UNIX Group associated        │      │  • Password (controlled by the  │
│    scripts                      │      │    person)                      │
│                                 │      │  • Person's Name, Phone, etc.   │
│                                 │      │  • List of UNIX Groups to which │
│                                 │      │    the operator belongs         │
└─────────────────────────────────┘      └─────────────────────────────────┘

        ┌─────────────────────────────────────────┐
        │ Associate action alerts of Operational  │
        │ Group to UNIX Group                     │
        └─────────────────────────────────────────┘

        ┌─────────────────────────────────────────┐
        │ Include Operational Group in ACL        │
        │  • UNIX Group name                      │
        │  • Windows' IDs for Operational Group   │
        │    "Edit" privileges                    │
        └─────────────────────────────────────────┘
```

Figure 3-1 NCCDS 98 Group Definition

The actual definition of Operational Groups and specification of operator's privileges are part the definition of NCC 98 Operational Positions and Operational Procedures. During routine

operations, the NCC 98 Operator Authorization role is dedicated to respond to changes of NCC 98 staffing and positions.

The Operational Groups defined in Section 3.4.2 are based on the Operational Roles defined in Section 3.3.2 which are derived from the aggregation of Operational Functions and Operational Tasks indicated in Appendix B. However, other Operational Groups' definitions can be based on different aggregation of the Operational Functions or the Operational Tasks. A new aggregation may define a new view of Operational Roles or may be used to define Operational Sub-Roles.

For example, SPSR developers used the view point of windows classes and defined the following Operational Groups:

- Edit privilege to all Customer Database windows

- Edit privilege to all the Scheduling Control DB windows

- Edit privilege to all the Space Network Database windows

- Edit privilege to all the Schedule Request windows

- Edit privilege to the TDRS Scheduling Window windows

- Edit privilege to all the Batch Schedule Generation windows

- Edit privilege to all the Active Schedule windows

- Edit privilege to all the Schedule Transmission Rule Set windows

- Edit privilege to all the Schedule Transmission windows

- Edit privilege to all the Vector Storage windows

- Edit privilege to the Vector Control Parameters window

- Edit privilege to the Delta-T windows

- Edit privilege to all the Vector Transmission Rule Set windows

- Edit privilege to all the Vector Transmission windows

- Schedule alert messages

- Vector Alert messages

This definition of Operational Groups is based on a subdivision in sub-roles of the Operational Roles defined in Appendix B and provides a more detailed granularity for the groups.

3.4.5 Operator Access to NCCDS 98 Components

The NCCDS 98 components accessed by an NCC 98 Operator largely depends on the Operational Roles to which the operator is assigned. Figure 3-2 provides a summary and a conceptual view of the ways to access the NCCDS 98 capabilities as a function of the operator's roles.
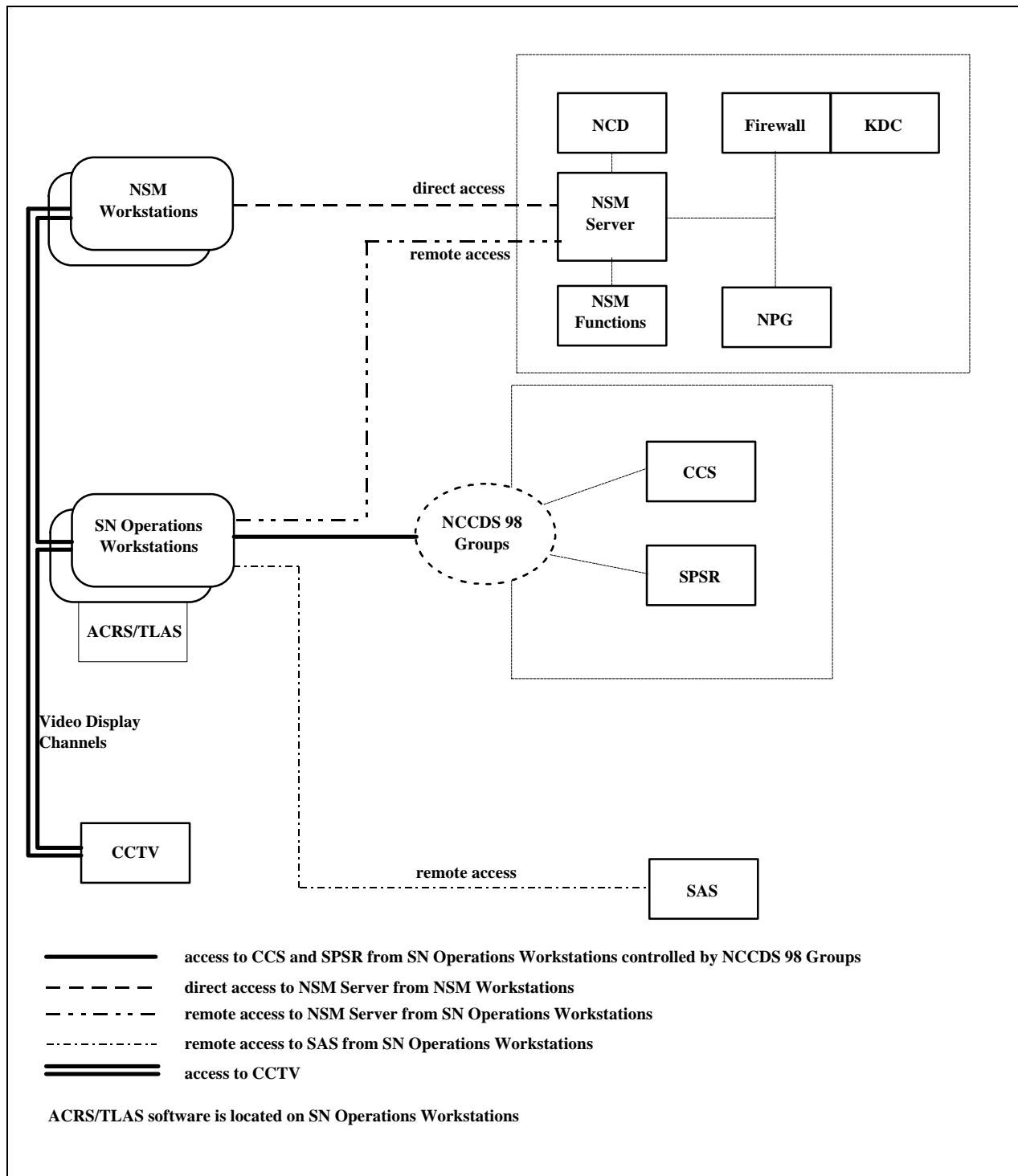
Figure 3-2 NCCDS 98 Operator Access

The lines connecting workstations to NCCDS 98 components indicate the logical access of the operator to the NCCDS 98 data and functionalities. The actual access and data transfer is provided via the OpsLAN.

The element labeled "NCCDS 98 Groups" shows the logical centralized control for accessing CCS and SPSR. The Operator Groups are implemented by means of database and software components which are distributed to NSM and SPSR.

The Figure illustrates the following types of operator's access:

a. Operators performing SN monitoring, control and scheduling, and acquisition data control may access CCS and SPSR from any workstation. The access to CCS and SPSR data and functions and the distribution of CCS and SPSR alerts is centrally controlled by NCCDS 98 Groups.

b. Operators performing NCCDS 98 system management can access functions provided by NSM, Firewall, KDC, and NPG from the NSM workstation and, remotely, from other workstations. Software components of NSM, Firewall, KDC, and NPG controls operator's access to the respective functions.

c. Operators performing SN activity reporting may use any workstation to remotely access SAS functions under control of SAS software components.

d. Operators performing SN performance support access ACRS/TLAS functionality from any workstation that includes this software. ACRS/TLAS software controls operator's access.

The WWW and FTP server is not included as an accessed component because it performs automatic activities controlled from SPSR (TUT generation) and NPG (acquisition data reception) respectively.

All NCC 98 operators may access CCS and SPSR data in a "view-only" mode from any workstation. In addition, they may use CCTV to view the data displayed on any workstation.

Section 4. NCC 98 Operator Activities

This Section provides an overview of the activities performed by NCC 98 operators to execute the tasks related to the operator's role. Major emphasis is given to the effect of new NCCDS 98 capabilities.

Activities related to NCC components that are not directly affected by the NCCDS 98 are expected to be substantially unchanged with respect to the definition of the baseline NCC SOP.

4.1 Activity classes for NCCDS 98

This Section limits its scope to ongoing operations (i.e., excluding initializations) and to activities related to the NCCDS 98 operational functions and NCCDS 98 failover.

Operator activities that are impacted by the new functionality of NCCDS 98 are related to:

1. access to the system

    - operator authorization

    - operator log-on

2. NCCDS 98 Groups

    - interaction with toolbar

    - interaction with alerts

    - GUI window access to CCS

    - database maintenance at SPSR servers

    - functionality of SPSR

3. centralized and automated network and system management

    - Network and System Management (NSM)

    - NCC Protocol Gateway (NPG)

4. access security

    - Firewall control and monitoring

    - Key Distribution Center (KDC) control and monitoring

The following paragraphs provide summaries of the impacted activities.

4.2 Operator Access to NCCDS 98

4.2.1 Operator Authorization

Activities involving NCC 98 Operator Authorization include authorization updates and changes to NCCDS 98 Group definition (Section 3.4 and Appendix C).

4.2.1.1 Update Operator Authorization

Operator authorization is updated when a new operator is added to the list of personnel authorized to access NCCDS 98 resources or when an operator changes role. The operator covering the NCC 98 Operators Authorization role performs this activity and is supported by NSM functions. This operator uses the System Administrator Manager (SAM) software utility and performs the following steps:

1. Enters the requested data about the new operator account.

2. Adds the new operator account to one or more UNIX groups.

3. Assigns a password.

The new operator will log-on and change the password.

Operator authorization is also updated when an operator's role is changed. The operator's account is added to or deleted from the UNIX groups involved with the new role privileges and authorizations.

4.2.1.2 Update NCCDS 98 Group Definition

NCCDS 98 Groups are updated when there are changes to definitions of NCC 98 Operational Position that are supported by CCS and SPSR. The operator covering the NCC 98 Operators Authorization role performs the updating and is supported by NSM functions and by the NCCDS 98 database utilities. Updating may require one or more of the following steps:

1. Create (or delete) the UNIX groups corresponding to the updated NCCDS 98 Groups.

2. Update Action Control List entries to reflect changes in privileges.

3. Update the mapping of action alert classes to the UNIX groups.

Changing NCCDS 98 Groups definition may also require to update the definition of affected Operational Groups, which specify operator privileges and action alert distribution (Section 3.4.3).

4.2.2 Operator Log-on

The activities for log-on to NCCDS 98 at a workstation depend on the Operational Role assigned to the operator. The operator enters name and password via the UNIX Log-on window. UNIX

log-on scripts verify the operator's authorization and identifies the UNIX Groups of which the operator is a member.

For UNIX Groups related to NSM, ACRS/TLAS, or SAS services the operator must perform a second log-on to the respective server. The UNIX Group scripts display a toolbar which includes ancillary functions and an icon that represents the server and confirms the authorization. The operator clicks on the server's icon to display the window for log-on to the NSM, ACRS/TLAS, or SAS server.

Operators who are members of NCCDS 98 Groups can directly access CCS and SPSR services. The corresponding UNIX Group scripts display a Main Panel with a toolbar and the Operator Alert window.

4.3 NCCDS 98 Groups

NCCDS 98 Groups operators interact with CCS and SPSR via specialized GUI windows. Illustration of the GUI windows and description of detailed activities for CCS and SPSR operators are in the NCCDS 98 User's Guide. This Section describes the Main Panel toolbar, the interaction with alerts, and outlines the access to the main CCS and SPSR functions from the Main Panel toolbar.

4.3.1 Main Panel Toolbar

The Main Panel toolbar is displayed in response to a valid log-on. The toolbar includes groups of icons that provide access to the primary functions available to a CCS and SPSR operator.

Main functions

  a. CCS functions access

- Site Status (menu)
- Performance (menu)
- Reconfiguration (menu)
- CCS Schedule (window)

  b. SPSR functions access

- Database Maintenance (menu)
- Data dissemination control (menu)
- Scheduling (menu)
- Scheduling status (window)
- Vector status (window)

Ancillary functions

  c. CCTV channel selection

  d. General utilities, such as

- Clock and date selection
- Text editor
- Printer
- Help

  e. Desk top configuration selection

  f. Log-off

Clicking on some of the icons displays the GUI window to directly access the function. Other icons are associated with pop-up menus from which lower level functions are. Any window restricts data editing and process activation only to operators who are members of NCCDS 98 Groups with such privileges.

4.3.2 Interaction with Alerts

The operator interacts with alerts by means of two windows: Operator Alerts and Action Alert Comments.

The Operator Alerts window is opened in response to a valid log-on. It displays the list of action alerts and the list of information alerts directed to the NCCDS 98 Groups of which the operator is a member. Via an Alert Filter/Sort text-entry box, the operator can limit the type of alerts that are displayed. The operator can select a displayed action alert to acknowledge it, clear comments associated with it, or open the Action Alert Comments window.

The operator uses the Action Alert Comments to view comments added by other operators. The operator can add comments to a selected action alert, or modify previously entered comments.

When a new action alert is received it is added to the action alert list and an audio signal is issued to call the operator's attention. If the same type of action alert is repeated, an information alert including the number of action alerts of that type which occurred in the previous minute is displayed every 60 seconds.

4.3.3 Interaction with CCS

The operator accesses the CCS functions via the icons of the Main Panel toolbar named as follows:

- "Site Status"
- "Performance"
- "Reconfiguration"
- "CCS Schedule"

Each of the first three icons are associated with a pop-up menu which allows selection of lower level functions. The last icon is used to open view-only displays.

4.3.3.1 Site Status

From the "Site Status" icon pop-up menu the operator can select:

a. "Static Data Transfer", to select limited or full data exchange from the SPSR database. Normally, the CCS database is automatically updated by means of a "new data" triggering mechanism between CCS and SPSR whenever fresh data are stored in the SPSR database.

b. "Network Site Status", to change site status, throttling rate, automatic Communication Test Message (CTM) flag, or to enable event CTM.

c. "Communication Test Block (CTB)", to select site ID and SUPIDEN where to send the CTB.

The handling of CTMs and CTBs by part of NPG depends on the communication protocol used by the sites. NPG sends the messages to a site using 4800 Bits Blocks and transfers back to CCS the received acknowledgments. NPG acts as a client proxy for a site using TCP/IP and sends to CCS the acknowledgments if the site is connected to CCS services.

4.3.3.2 Performance

From the "Performance" icon pop-up menu the operator can select:

a. "Performance Data (ODM)", to monitor TDRS summary data or to select details for a specific TDRS and service.

b. "Performance Data (UPD)", to select site ID and SUPIDEN and to enable or disable the UPD transmission.

4.3.3.3 Service Reconfiguration

From the "Reconfiguration" icon pop-up menu the operator can select:

a. "GCM Menu", to navigate to other windows and to select service reconfiguration or TDRSS-unique requests.

b. "OPM time-out", to reconfigure time-out value of Operation Message status.

4.3.3.4 Review Event Data and Review Service Data

The "CCS Schedule" icon activates the "Review CCS Active Schedule" window from which the operator can review SN events data and CCS event services for a specific SN event.

4.3.4 Interaction with SPSR

The operator accesses the SPSR functions via the following icons of the Main Panel toolbar:

- "Database"
- "Data Diss"
- "SPSR Sched"
- "Sched Status"
- "Vect Status"

Each of the first three icons are associated with a pop-up menu which allows selection of lower level functions. The last two icons are used to open view-only displays.

4.3.4.1 Database Maintenance

The Service Planning database is located on the SPSR server. The operator can access the database maintenance functions via the icon "Database" on the Main Panel. A pop-up menu provides access to the windows for the following database components:

    a. Customer

    b. Space Network

    c. Schedule Control.

Only operators that are member of NCCDS 98 Groups authorized to change one or more of the database components can access the database windows in "Edit" mode. All other operators can access the database display windows in view-only mode.

4.3.4.2 Acquisition Data Dissemination

From the "Data Diss" icon pop-up the operator can select:

    a. "Control Parameter", to modify vector transmission control parameters.

    b. "Vector Transmission Rule Set", to modify vector transmission rule sets.

    c. "Vector Transmission", to modify vectors and destination and to start a vectors' transmission.

    d. "Net Effect", to verify the list of vectors in a transmission and to generate Delta-T messages.

The "Vect Status" icon allows the operator to view the status of a vector transmission and to inhibit or reactivate a transmission.

4.3.4.3 Schedule Generation and Transmission

From the "SPSR Sched" icon pop-up menu the operator can select:

    a. "TSW Sets", to add, edit and delete TSWs.

    b. "Schedule Requests", to add, edit and delete SARs and to maintain wait lists.

    c. "Schedule Generation", to edit schedule inputs, to start the scheduling process and to review the generated schedules.

    d. "Batch Schedules", to evaluate generated batch schedules, to perform conflict resolution, and to activate a selected batch schedule.

    e. "Active Schedule", to maintain the active schedule and to perform conflict resolution.

    f. "Transmission Rule Set", to modify vector transmission rule sets.

    g. "Transmission", to modify, start, and control a schedule transmission.

   h.   "SLR Summary", to view a summary of Service Level Reports and the affected SHOs.

The "Sched Status" icon allows the operator to view the status of a schedule transmission and to terminate a transmission.

4.4 NCCDS 98 Support Operations

The NCCDS 98 support operations belong to two main Operational Roles:

1.   Security Administration includes the following functions:

   - Firewall control and monitoring

   - Key Distribution Center (KDC) control and monitoring

2.   System Management covers the following three classes of functions:

   2.1.   Functions related to the Network and System Management (NSM), which includes the following:

      - Control NCCDS configuration

      - Monitor NCCDS status and performance

   2.2.   Functions related to NCCDS Protocol Gateway (NPG) operations

   2.3.   Functions related to CCS monitoring and control, which are supported by the CCS System Monitor

The operators covering the NCCDS 98 support operations are supported by NSM and, normally, access the NSM server via dedicated NSM client workstations. The following paragraphs describe the functions, the activities performed, and the utilities employed in performing the functions.

4.4.1 Security Administration

The Security Administration has the following main functions and activities:

1.   Firewall control and monitoring

   2.1.   Define the Firewall access rules for external entity that the NCCDS communicates with via NISN Closed IONET.

      - Define the event or class of events controlled by the Firewall. An event is a combination of message source (IP Address), message destination (IP Address & Port), and service (protocol) requested by a customer.

      - Specify the responses of the Firewall to each event. The responses include action (e.g., drop or accept the request) and track (i.e., trap the event, log the event, and/or issue alarms).

     2.2.   Monitor the Firewall events.

- Respond to alarms issued according to the Firewall access rules.

- Analyze log files data.

2. KDC control and monitoring

     2.1.   Define the KDC connection configuration for each MOC that uses Kerberos services.

- Install the configuration file in the KDC.

- Provide the proper key-table file to the MOC.

     2.2.   Monitor the KDC events.

- Respond to security events.

- Unlock a KDC user that is locked out of a connection because a pre-defined limit on the number of connection errors is exceeded.

- Analyze log files data.

Security Administration uses a Firewall utility, such as a rule editor, provided by the Firewall Management software, to enter and compile the Firewall access rules. The Firewall Management software is located in the NSM server and is accessed via the NSM client workstations or via any NCCDS 98 workstation that runs the Firewall GUI.

The Firewall Modules send to the Firewall Management event alarms issued as defined in the Firewall access rules. Security Administration is notified of the event alarms.

The Firewall log files contain information about action and tracking of each event as specified in the Firewall access rules. The KDC log files contain information about the disposition of each ticket request performed by Kerberos and administrative actions performed on the KDC. Other log files related with security contain NCCDS Operator activities. The Security Administration operator analyzes the log files data to monitor security status and to detect possible security attacks and other anomalies.

4.4.2 System Management

The operators allocated to System Management Role cover functions that ensure the resources and connectivity for the NCCDS 98 processes. The functions allocated to System Management may be shared by a number of NCC 98 personnel with the proper Operational Position definition depending on skill requirements and workloads. The following paragraphs describe System Management's main functions and activities.

4.4.2.1 Functions related to NSM

System Management has the following main functions and activities in relation with NSM operations:

1. NCCDS 98 configuration control

    •   Define NCCDS hardware, software, and network configuration including the Name Resolution Services.

    •   Manages NCCDS configuration for switchover and failover

        •   Remote start-up and shut-down of NCCDS 98 nodes via pre-defined scripts: i.e., Firewall Modules, NPG servers, SPSR servers, and workstations (except CCS VAXes).

        •   Reconfigure the LAN connectivity in case of catastrophic failure of the OpsLAN hubs via hub management tools commands from the NSM client workstation.

        •   Assign software agents to NCCDS nodes and defines agents thresholds and monitoring intervals.

        •   Review NCCDS configuration and status.

2. Monitoring NCCDS 98 status and performance

    •   Monitor NCCDS nodes status: network connectivity status, systems components status, application processes status.

    •   Monitor NCCDS nodes' resource utilization via NSM displays.

    •   Monitor NCCDS traffic patterns and loads.

    •   Periodically (e.g., at start of shift) review performance reports from HP NetMetrix software.

    •   Identify potential abnormalities (e.g., LAN traffic, node traffic, CPU, and database activities).

    •   Determine likely cause of abnormality as a function of time of day and mission supported and identify existence of potential problems.

    •   Respond to anomalous conditions with support from NSM utilities and problem resolution database.

    •   Prepare reports describing NCCDS loads, status, and performance for review by operator and for baseline performance statistics for NCCDS system and network.

    Analysis of performance trends may provide early warning of potential problems.

3. Maintain back-up versions on tape of NCCDS 98 configuration data and databases:

    •   SPSR database, static and dynamic

    •   NSM databases and tables

- NPG tables

- Firewall rule tables

- KDC authentication and encryption tables

Database back-up can be performed automatically by the HP Omniback software under operator control and coordination. The back-up of SPSR database is performed periodically (e.g., daily incremental back-up and weekly full back-up). The back-up of SPSR database may be performed when the system is lightly loaded to avoid performance degradation. This may require activity coordination between NSM operator and SPSR operator.

4. Perform archiving of NCCDS message and data log files from disk to tape.

- SN messages logged on SPSR, CCS, and NPG (delogged on NCD)

- NPG SN site status (delogged on NCD)

- NCC Operator's activities (delogged on NCD for console operators)

- NSM events and operating systems log files

- Firewall events

- KDC ticket-request disposition

Disk log files archiving can be performed automatically by the HP Omniback software as a function of the size reached by each disk log file under operator control and coordination.

5. Control and manage tape cartridge content and storage.

- Label cartridges (tape media labeling is performed by HP Omniback).

- Mount and dismount tape cartridges when needed.

- Store cartridges in database tape archive repository.

- Control and manage back-up tapes content and location.

The NSM servers located in the Operational Suite and the ANCC operate on the same management domain that includes Operational Suite nodes and ANCC nodes. They have redundant databases which span the Operational Suite and ANCC nodes. System Management can use any active server to monitor and control the NCCDS 98 nodes that are part of the same management domain.

4.4.2.2 Functions related to NPG

System Management has the following main functions and activities in relation with NPG operations:

- Define NPG tables (e.g., routing tables, end-point definition tables, and related Nascom information tables).

- Store NPG tables in NPG database via NPG GUI.

- Respond to SN site state anomaly identified by NPG and notify CCS and SPSR operators.

The NPG database is localized on the NSM server and the NPG GUI is on the NSM client workstations.

4.4.2.3 Functions related to CCS Monitoring

The CCS VAX cluster is outside the NSM management domain. System Management has the following main functions and activities in relation with CCS operations:

- Monitor CCS VAX state via CCS System Monitor.

- Start-up and shut-down the CCS VAX and CCS processes.

- Create state tapes of CCS configuration files.

- Control tape archival of external message log files.

System Management monitors and controls the CCS from the CCS System Supervisor display and the VAX computer console.

4.5 NCCDS 98 Operations Recovery

4.5.1 General

Recovery activities allow NCCDS 98 operations to continue when planned maintenance or failures occur within the NCCDS 98. Recovery occurs at the following two levels:

- switchover within the Operational Suite from a prime component to a backup component

- failover from the Operational Suite to the ANCC

Activities executed by maintenance personnel to repair a failed component are outside the scope of NCCDS 98 operations recovery activities.

4.5.2 Switchover

Switchover is performed when an NCCDS 98 component that has backup redundancy fails. It consists in switching functionality from the prime component to a backup component which becomes the prime. Switchover may also be performed when new software is installed in a component of the Operational Suite.

Figure 4-1 shows the redundancy architecture of NCCDS 98. SAS does not have redundancy and ACRS/TLAS software resides on SN Operations workstations. Redundancy for NSM workstation is provided by the terminals associated with the NSM servers.
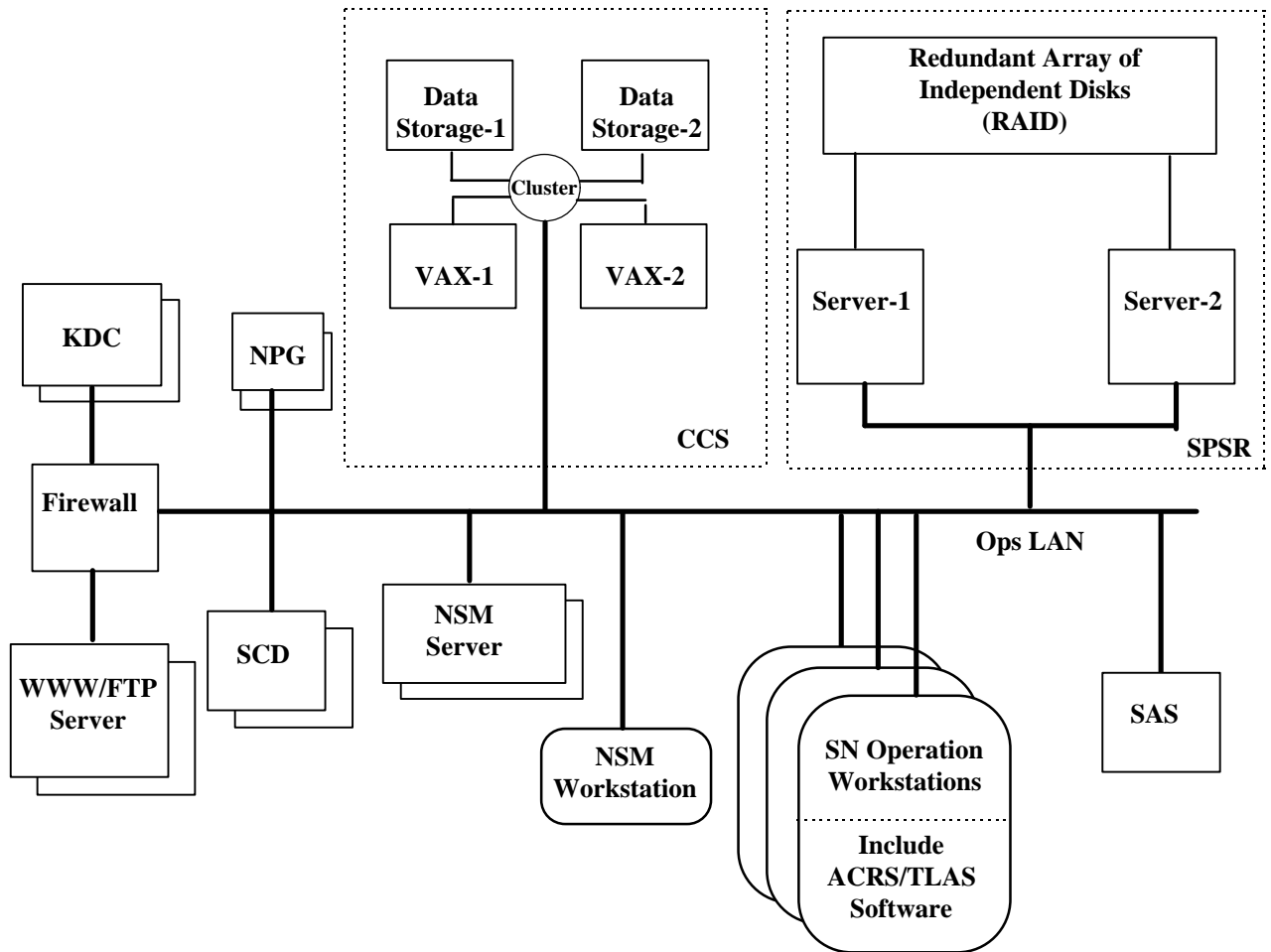
Figure 4-1. NCCDS 98 Redundancy Scheme

NCCDS 98 component faults are detected by the NSM from indications of anomalous performance conditions or from hardware sensors. The NSM can perform automatic shut-down of the failed component and automatic start-up of its backup. NSM operators are notified and may control the switchover via scripts from the NSM workstation.

Switchover activities depend on the specific faulty component. The following paragraphs outline the activities related to various cases of local switchover.

4.5.2.1 CCS Switchover

CCS has two VAX computers and data storage devices (prime and backup) connected in VAX Cluster. CCS switchover is controlled by the CCS computer operator who performs start-up and shut-down of CCS VAX and CCS processes.

A CCS prime data storage device failure has no direct impact on operations. The backup data storage device maintains shadow file data that are current with the primary file data and the data storage complex performs automatic switchover.

A CCS prime VAX failure has, normally, no direct impact on operations. In some cases, the failure may require manual switchover to the backup VAX or a warm start of the prime VAX. A cold start needed to re-initialize system software may require the operators to log-on again.

Connections with NSM, NPG, SPSR server, and workstations are restored automatically because CCS switchover keeps the same IP address for the CCS node. Connection with the SPSR databases is restored automatically by the database client and server software. The data transfer protocol takes care of restoring data integrity.

External sites using 4800BB protocols are automatically reconnected to CCS via NPG. Customers using TCP/IP protocol are responsible for restoring the connection with NCCDS (i.e., to NPG).

4.5.2.2 SPSR Switchover

SPSR has one prime and one backup server and a logically redundant database residing on a Redundant Array of Independent Disks (RAID) storage device with dual access controllers. The following considers failure of prime SPSR data storage or prime SPSR server.

The failure of one SPSR data storage disk has no direct impact on operations because the redundant complex maintains data integrity. In cases of more than one disk fails, the database is restored from backup tapes under control of NSM.

A SPSR prime server failure is detected by NSM which performs an automatic switchover to the backup server via Server Guard software. The NSM operator receives notification of the switchover and monitors the activities. Connections with NSM, NPG, CCS, and workstations are restored automatically because SPSR switchover keeps the same IP address for the SPSR server node.

CCS software detects the SPSR server failure. CCS can continue operations with its stored SN scheduled event data while these are current. There is an impact on CCS operations if the switchover time is too long. and restores automatically the connection with the SPSR server and the SPSR database. Connection with the SPSR databases is restored automatically by the database client and server software when the CCS software detects that the switchover is completed. The data transfer protocol takes care of restoring data integrity of the CCS files.

External sites using 4800BB protocols are automatically reconnected to SPSR by NPG. Customers using TCP/IP protocol are responsible for restoring the connection with NCCDS (i.e., to NPG).

4.5.2.3 NCC 98 Workstation Switchover

The NCC 98 operator workstations are in a number sufficient to provide effective redundancy.

In case of a workstation failure, the affected operator saves, if possible, the current work status and performs a log-off from the failed workstation. He/she moves the operations to any workstation that is not in use (i.e., a spare workstation). After the move, the operator performs normal log-on and resumes operations.

4.5.2.4 NPG Switchover

NPG has one prime and one backup component. A NPG prime server failure is detected by NSM which performs an automatic switchover to the backup server via highly available COTS products. The NPG tables, which are stored in mirror images on the NSM server, are automatically restored on the NPG. . The NSM operator receives notification of the switchover and monitors the activities. Connections with NSM, CCS, and SPSR are restored automatically because switchover keeps the same IP address for the NPG server node. External sites using 4800BB protocols are automatically reconnected to SPSR. Customers using TCP/IP protocol are responsible for restoring the connection with NCCDS (i.e., to NPG).

Updating NPG tables (e.g., when a new customer is added) is obtained by first changing the NPG backup component tables, performing a switchover from the current prime to the updated backup, and then changing the NPG tables on the previous prime which becomes the current backup.

4.5.2.5 NSM and Firewall Switchover

NSM server has one prime and one backup component. The NSM server also hosts the Firewall management software. When a NSM prime server failure is detected, NSM performs an automatic switchover to the backup server via Server Guard software.

The NSM database, which stores the NCCDS 98 connectivity and node status, is automatically restored by the NSM software (IT/O). The NSM operator needs to Log-on to the backup server. Connections with NPG, CCS, SPSR, and workstations are restored automatically because switchover keeps the same IP address for the NSM server node.

Switchover for Firewall modules and for the KDC server is automatically performed via highly available COTS products. controlled from NSM client workstations. Firewall and KDC tables are stored on NSM and automatically reloaded on Firewall and KDC servers. Connection with external sites is restored automatically.

4.5.3 Failover

Failover consists in transferring NCC 98 operations from the Operational Suite to the ANCC in situations that render the Operational Suite inoperable. The Operational Suite becomes partially or totally non operative in the following two general cases:

a. Planned maintenance to one or more of the NCCDS 98 segments or components that are operationally critical. This includes integration and verification of new operational software releases, replacing hardware components, or other major repair or test activities which require that operationally critical components be taken off-line. Planned failover is also performed for training NCC 98 personnel to perform failover activities.

b. Failure of one or more of the NCCDS 98 segments or components that are operationally critical. This includes mainly the failure of a primary when its back-up component is non operational.

The ANCC has equipment equivalent to Operational Suite (see Section 2.3) for sustaining NCC 98 operations (possibly at a reduced level) until the Operational Suite facilities are again operable.

Figure 4-2 shows the NCCDS failover configuration and illustrates the logical structure of Operational Suite and ANCC connectivity. It includes, for completeness, the connection with DT&T. DT&T does not participate in failover activities. Data transfer between operational suite, ANCC, and DT&T is provided by an encrypted virtual private network. Data flow with DT&T is automatically controlled by the Firewall.

Firewall and NPG provide connectivity with external entities. The Name Resolution Services tables include alternative entries for the addresses of the services provided by the nodes in the operational suite, the ANCC, and the DT&T. The requests for service and external messages are automatically transferred to the nodes that are currently active.

The NSM servers located in the Operational Suite and in the ANCC operate on the same management domain that includes the Operational Suite and the ANCC nodes. They have redundant databases which span the Operational Suites. The connectivity database of NSM is automatically kept current by the NSM software IT/O. System Management operators can use any active server to monitor and control the NCCDS 98 nodes that are part of the same management domain.

The traffic on the LANs and Firewall required to maintain continually synchronized the two versions of SPSR database, the one in the Operational Suite and the one in the ANCC, may degrade the NCCDS 98 performance to unacceptable levels. The Operational Suite database is installed in the ANCC site via the LANs network if it is operational at the time of failover as in the case of planned failover. If the LAN network is not operational, the most recent backup copy of the Operational Suite database is manually installed in the ANCC site. The database transaction log can be used if available, depending on the type of Operational Suite failure.

The tapes containing CCS configuration files are transferred from the Operational Suite to the ANCC and manually installed. This restores the proper configuration of the CCS.
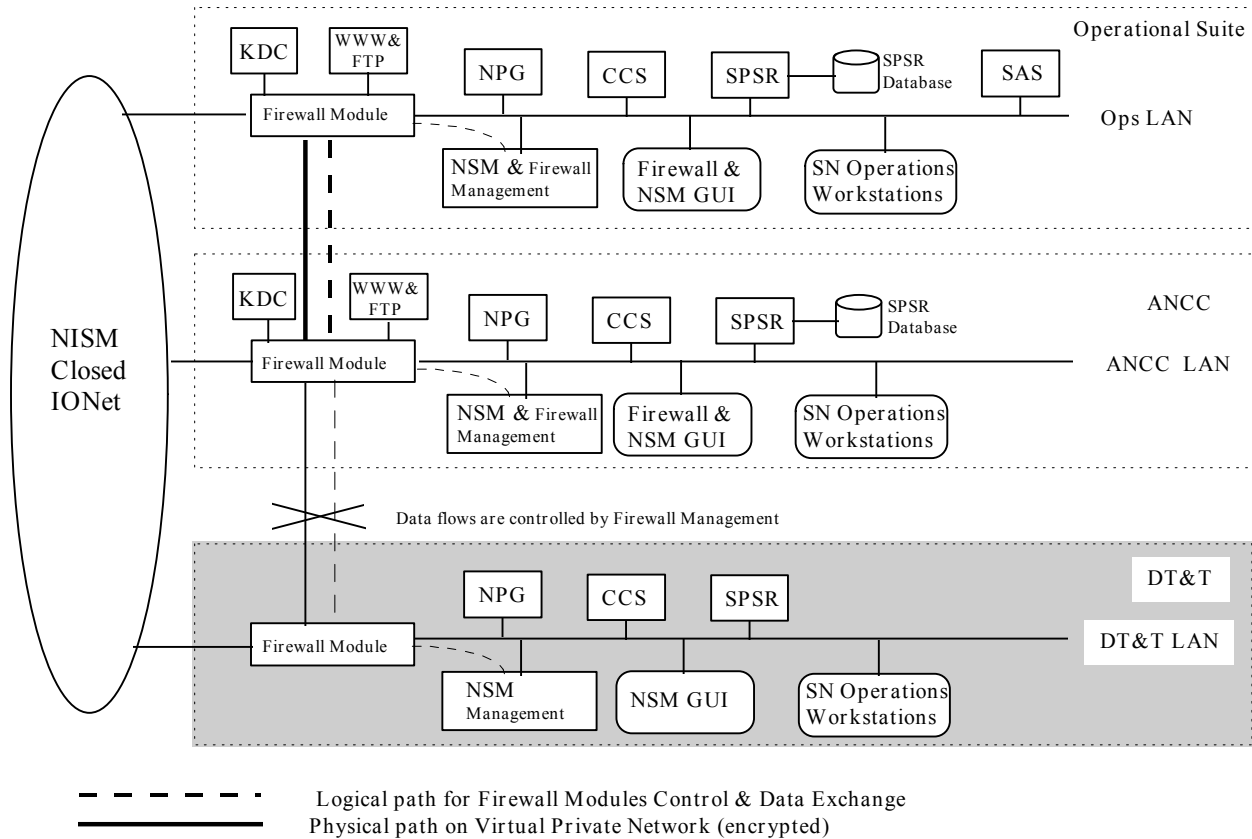
Figure 4-2. NCCDS 98 Failover Configuration

The NCCDS 98 operators can resume operations at the ANCC workstations after CCS and SPSR are operational. The log-on activity uses the same procedures as in the Operational Suite because it is controlled by the data of NCCDS 98 Groups that are stored in NSM and SPSR databases.

The connectivity with external entities is provided by Name Resolution Services, NPG, Firewall, and KDC components that are in the ANCC. Customer's connections are restored without NCCDS operator intervention because the customer's service requests are automatically transferred to the active servers (in the ANCC after failover is completed) via the Name Resolution Services tables which include aliases names of NCCDS services.

The following is the flow of activities occurring to reconnect the customers:

1. NCCDS server aliases names are resolved to IP addresses by Name Resolution Services

2. 4800 BB customers are reconnected to SPSR by NPG at start-up

3. TCP/IP customers will reconnect by means of cyclical connection attempts to service alias names.

    E.g., for a Schedule Request service, a TCP/IP customer connects first to:

    *   schReqh1.nascom.nasa.gov; then, if there is no response, to

    *   schReqh2.nascom.nasa.gov; then, if there is no response, to

    *   schReqh3.nascom.nasa.gov; and so on, up to the number of aliases.

In the example the names schReqh1, schReqh2, and schReqh2 are aliases for the same service (i.e., a Schedule Request service) which can respectively be provided by the prime SPSR, the backup SPSR, and the ANCC SPSR.

Other activities required for failover include the following:

a.   activate the CCTV connection;

b.   log-off and deactivate the Operational Suite workstations;

c.   transfer operations to ANCC facilities.

Return of NCCDS 98 operations from ANCC to Operational Suite includes essentially the same activities as those for failover.

Abbreviations and Acronyms

ACL	Action Control List
AMDS	Automated Message Distribution System
ANCC	NCC Auxiliary Operational Suite
CCTV	Closed-Circuit Television
CNE	GSFC Center Network Environment
CTB	Communication Test Block
CTM	Communication Test Message
DT&T	Development, Test, and Training
EIF	Engineering Interface
FDF	Flight Dynamics Facility
FPT	Flight Pattern Terminal
FTP	File Transfer Protocol
GN	Ground Network
GNSS	Ground Network Scheduling System
GUI	Graphical User Interface
IP	Internet Protocol
KDC	Key Distribution Center
MMDPS	Multi-Mission Display Processing System
MOC	Mission Operations Center
MOSA	Mission Operations Support Area
Nascom	NASA Communications
NCC	Network Control Center
NCCDS	Network Control Center Data System
NCD	NCC Central Delogger
NEST	NISN Event Scheduling Terminal
NISN	Nascom Integrated Services Network
NOC	Nascom Operation Center
NOP	NCC Operations Plan
NPG	NCC Protocol Gateway
NSM	Network and System Management
NTDS	NCC Timing Display System
NTS	NCC Test System
OCR 98	NCC 98 Operations Control Room
ODM	Operations Data Message (Performance Data)
Operational Suite	NCC Primary Operational Suite
Ops LAN	Operational Local Area Network
RAID	Redundant Array of Independent Disks
RFI	Radio Frequency Interference
SAM	System Administrator Manager (software utility)
SAMS	Shuttle Antenna Management System

SCD	Small Conversion Device
SDE	SPSR Development Environment (in Building 13)
SDF	Software Development Facility (in Greentec I)
SDPF,	Sensor Data Processing Facility
SERF	Software Engineering Research Facility (in Building 12)
SP&M	Special Projects and Missions
SN	Space Network
SOP	Baseline NCC Standard Operating Procedures
SRD	NCCDS 98 System Requirements Document
STDN	Spaceflight Tracking and Data Network
STRS	Scheduled Event Transmission Parameters
STS	Space Transportation System
TDRS	Tracking and Data Relay Satellite
TSW	TDRS Scheduling Window
TT&C	Tracking, Telemetry, and Command
TUT	TDRSS Unscheduled Time
UPD	User Performance Data
UTC	Coordinated Universal Time
VDS	Voice Distribution System
VTRS	Vector Transmission Parameters
WSC	White Sands Complex
WWW	World Wide Web

Position Abbreviations and Acronyms (from SOP)

AT	Acquisition/Tracking Controller
CC	Crypto Coordinator
CS	NCC Communication Specialist
DBA	Data Base Administrator
DBM	Data Base Manager
DOC	NCC Documentation
FA	Schedule Forecasting Analyst
GCC	Ground Communication Coordinator
GNOM	Ground Network Operations Manager
GNSO	Ground Network Scheduling Operator
LOG	Logistics
M&O	Maintenance and Operations
MC	Media Controller
MSM	Mission Support Manager
ND	Network Director
NEST	Network Engineering Support Team
NM	Network Manager
NOM	Network Operations Managers
NR	Network Reporting
OE	Operations Engineer

PA	Performance Analyst
PC	Parameter Control
SAC	Security Administrative Controller
SE	System Engineer
SMM	STDN Mission Manager
SNOM	Space Network Operations Manager
SO	Real-time Scheduling Operator
SWO	Security Watch Officer
TLM	Telemetry
TM	Technical Manager
TNA	TDRSS Network Analyst

Appendix A. Description of Baseline NCC Operational Positions

Appendix A provides a description of Baseline NCC Operational Positions extracted from Section 2 of the NCC Standard Operating Procedures, November 1995, 532-SOP-NCC/V1. The description is presented in tabular form in Table A-1 without reference to the location of operators within the NCC complex.

Column one of Table A-1 includes the position name, reference to SOP Section number, call symbol, and staffing. Column two provides position description in a more structured format than the free text format used in the SOP. To facilitate cross references, Baseline NCC Operational Positions described in this Appendix are listed in the same order as listed in Table 3-1.

The NCC 98 Operational Positions are expected to map from the baseline NCC. Several changes are due to consolidation following improved computational support and security considerations. Definition of NCC 98 Operational Positions is the responsibility of NCC 98 Operations Management and is outside the scope of this document.

Table A-1. Baseline NCC Operational Positions

Operational Position	Position Description

Network Manager (NM)
(SOP 2.3.2)
Staffing (NASA position):
a. Routine coverage:
  Monday through Thursday
  16 hours per day (0700-2300L);
  Friday 8 hours per day (0700-1500L);
  Sunday 8 hours per day (1500-2300L).
b. Space Shuttle coverage:
  24 hours per day
	NM is responsible for overall management and direction of NCC and STDN resources.
	NM is the NCC Contracting Officer's Technical Representative (COTR/N) for the TDRSS.
	NM has approval authority to implement procedures in response to emergency conditions which affect spacecraft operations and STDN support.
	NM serves as the management interface between the network customers, NCC, and STDN during real-time operations.
	NM determines the appropriate real-time network response when new program requirements occur during on-orbit mission support.
	NM, as required, interfaces with other governmental agencies, foreign and domestic control centers, and networks to resolve problems and conflicts.

Technical Manager (TM) (SOP 2.3.3) Staffing (Senior contractor position).	TM is responsible for: • supervising the NCC operating staff, and • maintaining operational integrity within the STDN. TM performs the functions of the NM during the NMs absence or as delegated by the NM.

Performance Analyst (PA)
(SOP 2.3.4)
Staffing:
(East PA) assigned to TDE support
(West PA) assigned to TDW support and
  TDRS-Spare support
PA assumes AT responsibilities when the
  AT position is unmanned
24 hours per day
	PA is responsible for:
	• monitoring real-time support performance,
	• validating performance standards, and
	• assisting the NCC TDRSS Network Controller in rapid failure identification and restoration of services.
	PA is responsible for:
	• post-event problem analysis,
	• receipt and tracking of all:
	  • Service Level Reports (SLR), and
	  • Equipment Status Reports (ESR),
	• monitoring and documenting NCC-scheduled Routine Verifications (RV),
	• conducting routine TDRSS tests, and
	• configuration of voice lines for use during playback.
	PA acts as assistant to the TM, assuming the TMs responsibilities in the OCR during TM absences.

Acquisition/Tracking Controller (AT) (SOP 2.3.5) Staffing: 8 hours per day (1000-1800 L)	AT is responsible for ensuring: • receipt of current acquisition data from the FDF, and • that appropriate vectors are transmitted to WSC for all SN-scheduled support

Table A-1. Baseline NCC Operational Positions

Operational Position	Position Description

NCC Scheduling
 	
(SOP 2.4.7)
 	
It is comprised of four scheduling elements:
   Real-time Scheduling (SO),
   Schedule Forecasting (FA),
   Parameter Control (PC), and
   Network Reporting (NR).
	NCC Scheduling is the scheduling interface for all STDN customers.
	NCC Scheduling is responsible for:
	• accepting support requests,
	• coordinating resolution of conflicting requests for support, and
	• scheduling all STDN resources.
	NCC Scheduling is responsible for:
	• development,
	• format control, and
	• issuance of network operations schedule and forecasts.
	NCC Scheduling is the single point for distribution of:
	• other appropriate scheduling documentation,
	• network statistical services, and
	• anomaly reports.

Scheduling Operator) (SO)
 	
(SOP 2.3.7)
 	
Operational position within the NCC
   Scheduling Section.
Staffing:
   24 hours per day
	The SO is responsible for coordination of all real-time requests of the STDN resources from customers.
	The SO
	• coordinates STDN support based on customers requests and resource availability,
	• performs and assists in real-time conflict resolution with customers, and
	• disseminates STDN schedules and BRTS support activities.

Forecast Analyst (FA)
 	
(SOP 2.3.6)
 	
It is part of Forecast Scheduling element.
Staffing:
   Monday through Friday
   8 hours per day (0800 to 1600L)
	FA is responsible for:
	• coordinating schedule requirements with SN customers, and
	• maintaining schedule-related data base information.
	The FA
	• receives Schedule Add Requests (SAR) from customers,
	• confirms resource availability,
	• analyzes scheduling conflicts, and
	• provides possible solutions to the customers.
	The FA transmits the confirmed schedules to the customers.
	The FA provides technical assistance in the preparation of test Briefing Messages (BM) and scheduling of test events.
	The FA generically schedules network testing.

Table A-1. Baseline NCC Operational Positions

Operational Position	Position Description

Parameter Control (PC)
 	
(SOP 2.4.8)
 	
It is an element of NCC scheduling
Staffing:
 	
   a. Nominal:
 	
      Monday through Friday,
 	
      8 hours per day;
 	
   b.   Space   Shuttle   &   Unmanned
Missions:
 	
      as required.
	PC is specifically responsible for the following tasks:
	
	• Scheduling and coordination of all premission and launch activities for the STDN.
	• Coordinating overall Tracking and Data Acquisition (T&DA) scheduling activities for the Space Shuttle.
	• Analyzing and coordinating future GN scheduling requirements and conflicts with GN customers, and coordinating GN station's down-time with customers and the GSFC Network Scheduling and Analysis Section, Code 532.2.
	• Establishing generic scheduling procedures for the Ground Network Scheduling System (GNSS) environment.
	• Maintaining and reviewing scheduling documentation for the STDN.
	• Development and issuance of the Network Operations Forecast.
	• Point of contact for distribution of the:
	   • STDN Link Commitment Schedule,
	   • Telemetry/Command Turnaround Tables, and
	   • STDN Telemetry/Tracking and Command Priority List.
	• Conducting the weekly Space Shuttle Scheduling Teleconference.

Network Reporting (NR)
 	
(SOP 2.4.10)
 	
It is an element of NCC Scheduling
Staffing:
 	
   Monday through Friday,
 	
   8 hours per day (0800 to 1600L).
	NR is specifically responsible for the following tasks:
	
	• Compiling the STDN Anomaly Report (SNAR).
	• Conducting the STDN Anomaly Committee (SNAC) meeting 2 days per week (Tuesday and Thursday), using the SNAR as agenda.
	• Generating and compiling Service Accounting System (SAS) computer reports for use in compiling the Summary of STDN Operations Report and Monthly Status Report (MSR) for the SN.
	• Preparing statistical charts and graphs for GSFC Network Scheduling and Analysis Section (Code 534.2) for incorporation into the MSR presentation.
	• Compiling Space Network Operator Error Reports and Generic Dropout / Late Acquisition Reports.
	• Updating and maintaining the STDN Trouble Tracking Report (TTR) database for use in reporting on TTR status.
	• Compiling the TTR MSR.
	• Updating and maintaining the Ground Network Management Information System (GMIS) database for use in compiling the Summary of STDN Operations Report and MSR for the GN.
	• Updating and maintaining the Spaceflight Tracking and Data Network Mnemonic Dictionary, STDN No. 520. NR is the prime point-of-contact for STDN Mnemonic Adds (SMA).

Table A-1. Baseline NCC Operational Positions

Operational Position	Position Description
Data Base Manager (DBM) (SOP 2.4.5) Staffing: (NASA)	The DBM is responsible for the implementation and maintenance of the NCC SN operational data bases. The DBM interfaces with SN customers and SN element data bases to incorporate changes and updates. For further information concerning the DBM's operational functions and responsibilities, refer to the Network Control Center Users Data Base Management and Control Plan, STDN No. 910.
Data Base Administrator (DBA) (SOP 2.4.6) Staffing: (Contractor)	The DBA is the NCC point of contact for coordinating data base requirements. The DBA is responsible for: • maintaining a library of current data bases, • restoring data bases, • inputting data into the data base as directed, • troubleshooting, and • maintaining data base documentation for the NCC. The DBA responds to the technical direction of the NASA DBM.

Ground Network Scheduling Operator (GNSO)
(SOP 2.4.9)
It is part of Real-time Scheduling which is an element of NCC Scheduling.
Staffing:
    Monday through Friday,
    0800 to 1600 LC.
Contact the SO during all other times.
	GNSO is responsible for coordination of all requests of GN resources from customers.
	The GNSO
	• commits GN resources based on customers' request and resource availability,
	• performs and assists in conflict resolution with customers, and
	• disseminates schedule to GN and other NASA/DOD Space Shuttle support elements at predetermined times.

Operations Engineer (OE)
(SOP 2.3.9)
Staffing:
    24 hours per day
	The OE is responsible for:
	• monitoring NCC computer system performance,
	• identifying and localizing NCC Data System (NCCDS) problems,
	• coordinating and restoring NCC service,
	• maintaining the status of outstanding ADP problems,
	• monitoring ADP problem repair progress, and
	• controlling the allocation and/or deallocation of:
	    • devices, and
	    • applications software.
	• coordinating the resolution of NCC computer system problems

System Engineer (SE) (SOP 2.4.11)	SE is responsible for monitoring and reporting the normal day-to-day activities in the Maintenance Section. SE is the point-of-contact for NCC elements that request technical assistance or information. SE is responsible for technical and operational assistance to the TM and OE.
Maintenance and Operations (M&O) (SOP 2.4.12) M&O includes Logistics (LOG)	M&O is responsible for providing technical and operational support to the NCC.

Table A-1. Baseline NCC Operational Positions

Operational Position	Position Description

Logistics (LOG)
(SOP 2.4.17)
It is an element of M&O.
Staffing:
  7 days a week,
  16 hours per day (0800 to 2400L).
	LOG is responsible for:
	• maintaining NCC property control, stock control, and equipment inventory, and
	• receiving all incoming shipments, issuing stock and supplies, and processing LOG parts requisitions.

Security Watch Officer (SWO) (SOP 2.3.8) Staffing: 24 hours per day	The SWO is responsible for ensuring that NCC personnel maintain and adhere to security requirements governing: • physical, • information, • personnel, • Communications Security (COMSEC), and • automated data processing. The SWO provides the operations focal point for security classification determination and control, and disposition of documents/media for the NCC. The SWO coordinates activities affecting overall security with the NM, TM, Security Administrative Controller (SAC), Media Controller (MC), and the security guard. The SWO is responsible for maintenance and operation of the COMSEC Facility (CF) and controls personnel access to the CF, COMSEC materials, and COMSEC equipment which are restricted to limited access.
COMSEC Custodian (SOP 2.4.2) Staffing: (NASA)	The COMSEC Custodian manages and controls the accountable COMSEC material in the COMSEC material control system charged to the GSFC COMSEC account. The COMSEC Custodian provides all COMSEC equipment and material on a hand-receipt basis to the Crypto Coordinator (CC) for the NCC COMSEC Facility.
Crypto Coordinator (CC) (SOP 2.4.3) Staffing: (NASA)	The CC is responsible to the COMSEC Custodian as the hand-receipt holder for all COMSEC equipment, documentation, and key material required in the NCC CF. The CC ensures the total control, use, safeguarding, and disposition of the NCC COMSEC assets. The CC also ensures compliance in operation of the COMSEC equipment through self and user representatives (i.e., NMs and SWOs) necessitated by continual 24 hours a day, 7 days a week operational support.

Security Administrative Controller (SAC)
(SOP 2.4.4)
Staffing:
  7 days a week,
  16 hours per day (0600 to 2200 L).
	The SAC is the principal point of contact for NCC complex access.
	The SAC is responsible for monitoring, controlling, and verifying that visitors are properly cleared for entry or (if not cleared) are properly escorted while in the NCC Complex.
	(TM is point of contact during unmanned periods).

Table A-1. Baseline NCC Operational Positions

Operational Position	Position Description
Media Controller (MC) (SOP 2.4.16) Staffing: 5 days per week, 8 hours per day.	MC is the issuing officer for all sensitive and/or classified documentation (except COMSEC) for use within the NCC Complex. MC is the principal point-of-contact for issuing and receiving delog tapes, printouts, and other NCC product (data) which require control. MC is responsible for maintaining the NCC Operations Library (NOL) and for archiving daily position logs. MC is responsible for the processing and audit trail of all NCC secure documents slated for off-site transmittal.
NCC Communication Center (Comm Center) (SOP 2.4.13) Comm Center is comprised of: Ground Communication Coordinator (GCC) and Communication Specialist(CS)	Comm Center is responsible for: • transmission, receipt, distribution, and accountability of all Administrative Message System (AMS), • teletype, facsimile, (secure and non-secure), message traffic and general administrative traffic, and • secure and non-secure voice recording and playback system.
Ground Communication Coordinator (GCC) (SOP 2.4.14) GCC is shift lead of Comm Center.	GCC is responsible for: • operation of the NCC Communication Center during the shift, • AMS, teletype, data, and facsimile message traffic, and • voice recording (secure and non-secure) and playback support.
NCC Communication Specialist (CS) (SOP 2.3.10) CS supports the NCC Communication Office	CS is the point of contact for processing the high-speed General Administrative Messages (GAM). CS assists the Ground Communication Coordinator (GCC) in the operation of the NCC Communication Center.
NCC Documentation (DOC) (SOP 2.4.15) Staffing: 5 days per week, 8 hours per day.	DOC is responsible for the control, status, and procedural verification of teletype changes for all operational documentation after incorporation and issuance into the STDN documentation system. DOC controls and issues the numbers for all numbered teletype control messages, Requests for Information or Clarification (RIC), Interim Support Instructions (ISI), STDN Network Directives (SND), and other messages sent by the NCC.
Network Director (ND) (SOP 2.5.2) Mission-Unique Staffing (NASA): 7 days per week, 24 hours per day during mission support, or as needed from launch count through the termination of early-orbit or landing support requirements.	ND is GSFC Network Division (Code 530) authority assigned to a specific mission. ND is responsible for: • control and technical operations of those parts of the STDN committed to supporting a specific mission, and • readiness and overall operations of STDN-supported launches.

Table A-1. Baseline NCC Operational Positions

Operational Position	Position Description

STDN Mission Manager (SMM)
(SOP 2.5.3)
Mission-Unique
Staffing: (Contractor)
  7 days per week,
  24 hours per day during mission support,
  or as needed.
	SMM is responsible for monitoring problem resolution activities and advising the ND, as required.
	During mission periods, SMM acts as a consultant to the mission ND and performs tasks as assigned.
	During pre-mission periods, SMM establishes future mission customer interface requirements.

Network Operations Managers (NOM)
(SOP 2.5.4)
Mission-Unique
Staffing: (Contractor)
  7 days per week,
  24 hours per day during mission support,
  or as needed
Include:
Space Network Operations Manager (SNOM)
Ground Network Operations Manager (GNOM)
	NOM is responsible for ensuring optimum use of STDN capabilities committed to support each flight project.
	Under the direction of the ND, NOM is responsible for:
	• implementing STDN operational procedures,
	• controlling the STDN configuration, and
	• coordinating the performance of all pre-mission and mission testing.

Mission Support Manager (MSM)
(2.5.5)
Mission-Unique
Staffing: (NASA or designee)
  7 days per week,
  24 hours per day during mission support,
  or as needed.
	MSM has a comprehensive knowledge of:
	• resource distribution,
	• operational facilities,
	• constraints at ground facilities and customer control center,
	• unique mission requirements, and
	• pre-launch validation requirements.
	MSM acts as an NCC mission requirements advisor.

TDRSS Network Analyst (TNA)
(SOP 2.5.6)
Mission-Unique
Staffing (Contractor):
  during Space Shuttle mission
  7 days per week;
  24 hours per day,
  or as required
	TNA is knowledgeable of the SN system's hardware/software capabilities in determining network performance.
	TNA assists operational support personnel by providing the technical expertise to the customer POCC, NCC, WSC, and FDF in resolving the operations/mission-related anomalies.

Table A-1. Baseline NCC Operational Positions

Operational Position	Position Description
Network Engineering Support Team (NEST) (SOP 2.5.7) Mission-Unique Staffed: in Mission Operations Support Area, by engineers who specialize in the specific areas of the GN tracking stations. as required for all pre-mission and mission activities Composed of functional categories: Command (CMD), Telemetry (TLM), Data, Air-to-Ground/Ground-to-Air (A/G) communications, and Tracking Systems (TRACK).	NEST analysts are assigned to the category of their expertise. NEST analysts are required to be knowledgeable of all equipment operations procedures.
ND Report Team (SOP 2.5.8) Mission-Unique Staffing: (Contractor) during Space Shuttle mission periods	The ND Report Team cooperates with the SMM. The ND Report Team provides Daily Summary Reports to the ND that include both SN and GN problems. The ND Report Team compiles: • a Mission Summary Report which includes all major problems encountered during the mission period, and • a Mission Anomaly Report which includes assigned action items and is transmitted to network elements by teletype.

Appendix B. Definition of NCC 98 Operational Roles

Appendix B provides a detailed definition of NCC 98 Operational Roles by combining in a coordinated way Operational Functions and Operational Tasks.

For each Operational Function (see Section 3.2.2), Operational Tasks have been derived from a detailed analysis of the SRD. The definition of Operational Function and Operational Roles is updated as new information from NCCDS 98 development teams (mainly NSM and Security) and from NCC operations becomes available.

The definition of NCC 98 Operational Roles are in Table B-1. Table B-1 includes the Operational Role name from Table 3-2 in the first column, the definition of the role in the second column, and explanatory notes in the third column. The role definition includes all Operational Tasks assigned to the role divided into sets according to the Operational Function of which they are part. A reference code to Section 3.3.1, where the Operational Function is specified, is also included in the entries of the second column (the reference code consists of the subsection and bullet index, e.g., "3.3.1.**1 a**" is indicated as "**1.1**"). The notes address specific characteristics of the functions, tasks, and automated support provided by NCC 98 to the role.

Table B-1. NCC 98 Operational Roles Definitions (Details)

Operational Role	Role Definition	Notes
SN Performance Monitoring	(2.4) Control SN Performance Data Dissemination to customers. • Receive information alerts for valid UPDRs; • Respond to action alerts for invalid UPDRs; • Review active schedules and event services; • Enter UPDRs; • Review UPDR list; • Respond to action alerts for ODMs with invalid TDRS ID or service identification parameters. (3.1) Perform Network Monitoring and identify anomalies. • Review active schedules and event services; • Select TDRSs and review TDRS summaries of service status; • Select TDRSs and review details of service status; • Respond to action alerts; • Receive alerts relative to impending start and end of each event; • Track SLRs; • Issue communication test messages and review network site status; • Review ODM data; • Perform anomaly identification and recovery. (3.2) Perform Post-Event Problem Analysis. • Review event services; • Select TDRSs and review TDRS summaries of service status; • Select TDRSs and review details of service status; • Respond to action alerts; • Review Return Channel Time Delay and Time Transfer message data; • Perform anomaly identification and recovery.	These NCC 98 functions are automatically performed. The operational functions are mainly based on exceptions control. The SN Performance Monitoring role contacts (via voice, fax) customers and operators of other entities external to the NCC. The SN Performance Monitoring role is supported by: CCS network monitoring applications, and CCS-GUIs dedicated to interface the operator with data displays and data entry, MMDPS applications, and MMDPS-GUIs via the CCTV.
SN Performance Monitoring	(3.3) Evaluate RFI and Mutual Interference Prediction. • Set evaluation and simulation parameters; • Evaluate results and coordinate request editing with customer.	The role is supported by ACRS/TLAS which is an application of NCCDS and by the ACRS/TLAS-GUIs

Table B-1. NCC 98 Operational Roles Definitions (Details)

Operational Role	Role Definition	Notes
SN Controller	(2.3) Control Service Reconfiguration Requests. • Receive information alerts for valid GCMRs; • Respond to action alerts related to invalid or NCCDS rejected GCMRs; • Resolve inconsistencies in User Reconfiguration GCMRs; • Review active schedules and event services; • Review current configuration of ongoing services; • Enter TDRSS-unique and user reconfiguration requests; • Respond to action alerts related to invalid OPMs; • Respond to action alerts related to GT; • Respond to Acquisition Failure Notification.	This NCC 98 function is automatically performed. The operational functions are mainly based on exceptions control. The SN Controller role contacts (via voice, fax) customers and operators of other entities external to the NCC. The SN Controller role is supported by CCS service reconfiguration control applications, SPSR-DBMS applications, and CCS-GUIs dedicated to interface the operator with data displays, with CCS applications, and database services.
Acquisition Data Controller	(2.2) Control Acquisition Data Reception and Dissemination. • Respond to alerts relative to end of incoming vector transmission and to reception of maneuver sequence; • Respond to alerts relative to invalid vectors; • Set vector retention parameters; • Review received and stored vectors; • Shift epoch time of vectors; • Enter, copy, edit, and delete vectors; • Move vectors between primary and secondary storage; • Respond to GT administrative message requests relative to TDRS maneuvers; • Define Vector Transmission Rule Sets (VTRS) and transmission control parameters; • Review and modify transmission content; • Execute manual mode transmission; • Execute, delay, cancel a semi-automatic mode transmission; • Execute, cancel a normal throughput mode transmission; • Monitor transmission progress; • Respond to alerts relative to rejected state vectors; • Transmit free-text or hard-copy messages when needed; • Terminate or inhibit transmission. The Acquisition Tracking Controller manages the reception of acquisition data from FDF or customers and controls their transmission to WSC or customers. Definition of VTRS is responsibility of the Service Planning Database Analyst; the Acquisition Tracking Controller may temporarily update the VTRS.	This NCC 98 function is semi-automatically performed. The operational function is mainly based on exceptions control. The Acquisition Tracking Controller role contacts (via voice, fax) customers and operators of other entities external to the NCC. The Acquisition Tracking Controller role is supported by SPSR transmission control applications, SPSR-DBMS applications, and SPSR-GUIs dedicated to interface the operator with data displays, with SPSR applications, and database services.

Table B-1. NCC 98 Operational Roles Definitions (Details)

Operational Role	Role Definition	Notes
SN Scheduling Analyst	(1.2) Interact with Schedule Related Messages. • Respond to alerts for invalid customers requests; • Respond to GT requests (GAMs) for scheduling SN resources; • Update SN resources availability in the SN database according to accepted GT requests; • Monitor SLRs; • Update SN resources availability in the SN database according to SLR content; • Manage TSWs; • Enter, update, copy, and delete schedule related messages used for service scheduling. The Service Planning Database Analyst is responsible for updating SN resources as requested and notified by the SN Scheduling Analyst (1.3) Control the Scheduling Process. • Define boundary between automatic and batch scheduling; • Define alert period for automatic updates to schedule; • Define alert period for reception of customer requests; • Select input for batch schedule; • Manage, review, and update scheduling priority lists; • Start batch schedule generation; • Evaluate batch schedules and perform conflict resolution; • Activate schedule, freeze schedule, and review wait lists; • Control wait lists processing; • Control automatic schedule generation; • Coordinate request editing with customer. This function may involve updating the scheduling boundaries and editing and deleting customer requests.	The SN Scheduling Analyst role contacts (via voice, fax) customers and operators of other entities external to the NCC. The SN Scheduling Analyst role is supported by NCCDS (alerts) and SPSR applications, SPSR-DBMS services, and NCCDS and SPSR-GUIs dedicated to interface the operator with alerts and with SPSR applications and database services.

Table B-1. NCC 98 Operational Roles Definitions (Details)

Operational Role	Role Definition	Notes
SN Scheduling Analyst (Continued)	(1.4) Control TDRSS Unscheduled Time (TUT) Generation. • Specify period and time of day for generating TUT information; • Initiate generation of TUT information; (2.1) Control Dissemination of Service Schedules and Updates. • Define Schedule Transmission Rule Sets (STRS); • Define transmission segment control parameters; • Respond to prompt for activated schedule initial transmission (USMs and SRMs); • Review and modify transmission content; • Review and select transmission destination; • Control semi-automatic mode transmission execution; • Execute manual transmission when needed; • Monitor transmission progress; • Respond to alerts relative to schedule status messages from GT; • Transmit free-text or hard-copy messages when needed; • Terminate or inhibit transmission. Definition of STRS is normally responsibility of the Service Planning Database Analyst; the SN Scheduling Analyst may temporarily update the STRS.	This NCC 98 function is automatically performed. The operational function is mainly based on exceptions control.
Space Network Activity Reporting	(4) Define reports and report generation parameters. • Review historical log content; • Define reports and review report generation parameters; • Modify and delete pre-defined reports; • Specify report generation time intervals; • Select report for generation.	Service accounting provides information on quantity and quality of services provided to SN customers, on the effectiveness of network utilization, and on internal NCCDS performance. The service accounting function performs automatic data collection and report generation. The operator controls the report generation and reviews the generated reports. The Network Reporting role is supported by the NCCDS data logging function, Network and System Management functions, and by the Service Accounting System (SAS) which is a segment of the NCCDS.

Table B-1. NCC 98 Operational Roles Definitions (Details)

Operational Role	Role Definition	Notes
Service Planning Database Analyst	(1.1) Maintain the Service Planning Database. Define and maintain the Space Network database: • TDRS names, assignments of TDRS to SGLT, and TDRS resources availability, • Ground terminal names, SGLT, and resources availability, • MDM and HDRM bandwidth capacities and parameters, • User interface channels and port addresses; Define and maintain the Customer database: • General customer parameter, • Level of support, • Service parameter valid values, • Service specification codes (SSC), • DQM setup parameters, • Nascom parameters, • Prototype events, • User IDs and passwords; Define and maintain the event scheduling control database: • Mission priorities list, • TDRS sets, • SA antenna slew time, • Time-dependent data retention criteria, • Scheduling priority lists, • Batch and automatic scheduling boundary, • Alert period for automatic updates to schedule, • Alert period for reception of customer requests. The last four items of the scheduling control database are normally updated as is needed by the SN Scheduling Analyst The Service Planning Database Analyst is responsible for updating SN resources as requested and notified by the SN Scheduling Analyst following acceptance of GT requests or reception of SLRs. The Service Planning Database Analyst is responsible for the definition of Schedule Transmission Rule Sets (STRS), schedule transmission segment control parameters, Vector Transmission Rule Sets (VTRS), and vector transmission control parameters.	The Service Planning Database Analyst role s supported by SPSR-DBMS services and SPSR-GUIs dedicated to interface the operator with SPSR database services.

Table B-1. NCC 98 Operational Roles Definitions (Details)

Operational Role	Role Definition	Notes
NCC 98 Operators Authorization	(5.1) Assign to NCC 98 Operators the privileges for accessing NCCDS 98 system resources. • Define NCCDS 98 Groups; • Associate alerts and operator privileges to one or more groups; • Specify alerts as information or action for a group; • Specify operator membership to one or more groups; • Control operator password and privileges.	To authorize NCC 98 Operator NCC 98 Operators Authorization role is supported by NSM, SPSR-DBMS applications and SPSR-GUIs
NCC 98 System Operations Management	(5.3) Define NCC Hardware, Software, and Network configurations. • Define hardware configuration (primary, backup); • Define software allocation to hardware; • Define LANs configuration; • Define node addresses and DNS; (5.4) Manage connectivity with external sites (NPG tables) (5.5) Manage NCCDS 98 data archiving and database backup (5.6) Manage NCC performance (workloads and response times). (5.7) Manage NCC Hardware, Software and Network configuration in response to performance or availability problems. (5.8) Manage NCC failure recovery. (5.9) Manage NCCDS Development, Testing, and Training.	The NCC 98 System Operations Management role is supported by the capabilities provided by the Network and System Management System and NCCDS Protocol Gateway.
NCC 98 Security Administration	(6.1) Administer automated access controls that limit access to NCC 98 resources and data through messages exchanged with external sites. (6.2) Administer the control of security services applied to messages exchanged between NCC 98 and external sites. (6.3) Administer mechanisms designed to limit communications between NCC 98 resources and external entities to authorized end-points and protocols (6.4) Control and review message and operator action security audit logs.	The NCC 98 Security Control role is supported by Firewall, KDC and NSM software.

Appendix C. NCCDS 98 Operational Groups

C 1   Introduction

Operational Groups specify all privileges and alert for any operator that will be member of the groups. The definition of an Operational Group provides inputs to the implementation of NCCDS 98 Groups and is defined on the basis of Operational Roles and associated list of privileges and action alerts for an operator accessing CCS and SPSR.

The Operational Groups definition is based on analysis of the following areas as they relate to the Operational Functions of each Operational Role (Appendix B):

    a.   privileges of manipulating data (e.g., edit, update, add, store);

    b.   privileges of executing processes (e.g., generate schedule, activate schedule, activate transmissions) and restrictions (e.g., only review active events, only monitor transmission status);

    c.   allocation and boundaries of specific action alert classes.

Appendix C contains analysis details in Tables C-1 and C-2. Table C-1 includes a preliminary identification, for each Operational Role, of all alerts sent to an operator covering that role and provides a preliminary indication of the type, action or information, of each alert: The operator should respond to the action alerts. The alert preliminary identification is obtained from the NCCDS 98 SRD. Table C-2 includes a preliminary identification of the specific support provided by CCS and SPSR to each Operational Function of each Operational Role and provides a preliminary indication of the windows that the operator uses to activate CCS and SPSR functionalities.

C 2   Allocation of NCCDS 98 Alerts to Operational Roles

Definition of NCCDS 98 Operational Groups includes the specification of the distribution of NCCDS 98 alerts to operators. The following Tables C-1.a through C-1.d list all the alerts to NCCDS 98 Operators identified in the SRD, 1998. Alerts are grouped by Operational Role with a Table for each operational role. The operators who cover the Operational Role receive the alerts listed in the table.

Each Table includes the following items:

    a.   SRD reference. The content of SRD reference column is necessary for understanding the alert description and condition. The column includes:

        1.   SRD section number and subsections reference (e.g., (b.1)) where the alert requirement is specified;

    2.   SRD section and subsection titles.

b.   Symbol for alert type (refer to SRD section 9.3.4.2 for definition of type):

    1.   "I" for information Alert, or

    2.   "A" for action Alert

c.   Alert description and condition:

    1.   The alert description and condition text is copied directly from the SRD specification;

    2.   Use of "Italic" font has the same meaning as that used in the SRD;

The definition of alert type is only illustrative. An alert is defined "action" if the SRD indicates that the operator performs some activity upon reception of the alert. Action alerts are also identified from a preliminary assessment of the alert condition criticality.

Table C-1.a. Alerts for "SN Scheduling Analyst" Role

SRD Reference	Type	Description
5.2.2.4 Service Planning Database, Space Network Data, Effects of Mapping Updates (b.)	I	Whenever there is any update to these mappings that may affect scheduled events for which schedules have not yet been transmitted, the NCCDS shall alert the operator.
5.2.2.4 Service Planning Database, Space Network Data, Effects of Mapping Updates (c.3.)	A	Whenever there is any update to these mappings that affects events for which schedules have been transmitted but that have not yet reached their scheduled event start times: For events that can be supported as modified, alert the operator, generate a set of schedule update messages, and provide the operator with the capability to review and transmit these messages.
5.2.2.4 Service Planning Database, Space Network Data, Effects of Mapping Updates (c.4.)	A	Whenever there is any update to these mappings that affects events for which schedules have been transmitted but that have not yet reached their scheduled event start times: alert the operator if there are any events that cannot be supported, and provide the operator with the capability to delete or reschedule these events.
5.2.4.4.5 Service Planning Database NCCDS Scheduling Control Data, Reset of the Relative Boundary (b.)	A	If the relative boundary is the current boundary or if its reset would make it become the current boundary, the NCCDS shall alert the operator and then provide the operator with three options: (see SRD 5.2.4.4.5)
5.3.2.2.4.3 Schedule Messages, Invalid Schedule Add Requests (b.)	I	If an incoming SAR is invalid, the NCCDS shall alert the operator.
5.3.2.2.4.4 Schedule Messages, Valid Schedule Add Requests (c.2.)	A	If the request applies to the SAR batch scheduling subphase and is received during the customer request reception alert period (refer to SRD paragraph 5.2.4.6), the NCCDS shall alert the operator.
5.3.2.2.5.3 Schedule Messages Invalid Alternate Schedule Add Requests (b.)	I	If an incoming Alternate SAR is invalid, the NCCDS shall alert the operator.
5.3.2.2.5.4 Schedule Messages, Valid Alternate Schedule Add Requests (e.)	A	If the request is received during the customer request reception alert period (refer to SRD paragraph 5.2.4.6), the NCCDS shall alert the operator.
5.3.2.2.6.3 Schedule Messages, Invalid Replace Requests (b.)	I	If an incoming Replace Request is invalid, the NCCDS shall alert the operator.

Table C-1.a. Alerts for "SN Scheduling Analyst" Role

SRD Reference	Type	Description
5.3.2.2.6.4 Schedule Messages, Valid Replace Requests (c.2.)	A	If the request applies to a request currently stored for batch scheduling and is received during the customer request reception alert period (refer to SRD paragraph 5.2.4.6), the NCCDS shall alert the operator.
5.3.2.2.6.4 Schedule Messages, Valid Replace Requests (c.3.)	I	If the Replace Request applies to a request currently stored for batch scheduling and that request has resulted in an event(s) being placed in a batch schedule(s) that has not been activated, the NCCDS shall remove the event(s) from the batch schedule(s) and alert the operator.
5.3.2.2.7.3 Schedule Messages, Invalid Wait List Requests (b.)	I	If an incoming Wait List Request is invalid, the NCCDS shall alert the operator.
5.3.2.2.8.3 Schedule Messages, Invalid Delete Requests (b.)	I	If an incoming Delete Request is invalid, the NCCDS shall alert the operator.
5.3.2.2.8.4 Schedule Messages, Valid Delete Requests (c.)	I	If the Delete Request applies to a request currently stored for batch or wait list processing and that request has resulted in an event being placed in a batch schedule that has not been activated, the NCCDS shall remove the event from the batch schedule and alert the operator.
5.3.2.3.2 Schedule Messages, TDRS Maneuver Request	A	Upon receipt of a TDRS Maneuver Request, the NCCDS shall alert the operator and provide the operator with the capability to request a display of the contents of the message.
5.3.2.3.3 Schedule Messages , Preventive Maintenance Request	A	Upon receipt of a PM Request, the NCCDS shall alert the operator and provide the operator with the capability to request a display of the contents of the message.
5.3.5 Schedule Messages, Responses to Schedules, (b.) Ground Terminal	A	Upon receipt of a SHO Status message indicating any condition other than unqualified acceptance, the NCCDS will alert the operator.
5.3.5 Schedule Messages, Responses to Schedules , (c.) Nascom CSS (Deleted)	A	Upon receipt of a Nascom Schedule Accept/Reject message indicating rejection, the NCCDS will alert the operator. (Deleted)
5.3.6.3 Schedule Messages, Invalid TSWs	A	If a TSW is invalid, the NCCDS shall alert the operator.
5.3.6.4.1 Schedule Messages, Valid TSW, Storage	I	When new TSW information is an update to previously stored TSW information for the same timespan, customer spacecraft, TSW set ID, and TDRS, the NCCDS shall alert the operator.
5.3.6.4.2 Schedule Messages, TSW Updates, (a.) Fixed events on the active schedule	A	The NCCDS shall review each applicable fixed event to verify that it still fits in the new TSW. If it does not, the NCCDS shall alert the operator.

Table C-1.a. Alerts for "SN Scheduling Analyst" Role

SRD Reference	Type	Description
5.3.6.4.2 Schedule Messages, TSW Updates, (b.) Flexible events on the active schedule	A	The NCCDS shall review each applicable flexible event to verify that it still fits in the new TSW. If it does not, the NCCDS shall alert the operator.
5.3.6.4.2 Schedule Messages, TSW Updates, (d.) Batch schedules	I	For batch schedules that have not been activated, the NCCDS alerts the operator that new TSWs that may apply to the batch schedules have arrived. The NCCDS does not automatically review the schedules. The operator may rerun the schedules.
5.3.7 Schedule Messages, TDRSS Status	A	Upon receipt of an SLR, the NCCDS shall alert the operator and shall provide the operator with the following capabilities: (see SRD 5.3.7) Also SN Controller
5.4.3 Scheduling Rules, TDRS Scheduling Windows	A	If upon attempting to schedule an event that requires use of TSWs the NCCDS determines that the applicable TSWs have not been stored within the NCCDS, the NCCDS shall alert the operator.
5.5.3.7 Scheduling Process, Batch Scheduling Results	I	Upon completion of a batch scheduling process, the NCCDS shall notify the operator that the process is complete and provide the operator with the capability to review the results. (Refer to SRD paragraph 5.7.)
5.5.4.2.1 Scheduling Process, Schedule Activation, Audit, Completeness	A	When the operator selects a schedule for activation, the NCCDS shall audit the schedule to ensure that the batch schedule processing that created the schedule included all schedule requests applicable to the time period of the selected schedule. If any were omitted, the NCCDS shall alert the operator and provide the operator with a display indicating the omitted requests or requirements.
5.5.4.2.2 Scheduling Process, Schedule Activation, Audit, Conflicts	A	When the operator selects a schedule for activation, the NCCDS shall audit the schedule to ensure that it does not conflict with any events on the active schedule. If there are any conflicts, the NCCDS shall alert the operator and provide the operator with a display indicating the conflicts.
5.5.4.2.3 Scheduling Process, Schedule Activation, Audit, TDRS Scheduling Windows	A	When the operator activates a schedule, the NCCDS shall review each event to verify that each service within the event fits within the newest available applicable TSWs If there are any that do not, the NCCDS shall alert the operator.
5.5.4.2.4 Scheduling Process, Schedule Activation, Audit, TDRS Mapping Updates	A	When the operator activates a schedule, the NCCDS shall review each event to verify that it is valid in terms of the newest TDRS mappings (refer to SRD paragraph 5.2.2.2). If any are not valid, the NCCDS shall alert the operator.

Table C-1.a. Alerts for "SN Scheduling Analyst" Role

SRD Reference	Type	Description
5.5.6.3 Scheduling Process, Automatic schedule updates, Schedule Add Request, (a.3.) successful	I	Alert the operator if the update occurs within an operator-specified interval from the current time. (Refer to SRD paragraph 5.2.4.5.)
5.5.6.3 Scheduling Process , Automatic schedule updates, Schedule Add Request, (b.2.) unsuccessful	A	Alert the operator.
5.5.6.5 Scheduling Process, Automatic schedule updates, Replace Request, (a.4.) active schedule successful	I	Alert the operator if the update occurs within an operator-specified interval from the current time. (Refer to SRD paragraph 5.2.4.5.)
5.5.6.5 Scheduling Process, Automatic schedule updates, Replace Request, (b.2.) active schedule unsuccessful	A	Alert the operator.
5.5.6.6 Scheduling Process, Automatic schedule updates, Delete Request, (c.) active schedule	I	Alert the operator if the update occurs within an operator-specified interval from the current time. (Refer to SRD paragraph 5.2.4.5.)
5.5.6.7 Scheduling Process, Automatic schedule updates, Wait List Processing, (a.) event deleted from active schedule	I	If wait list processing is enabled in semiautomatic mode (refer to SRD paragraph 5.5.7j.3) and any requests were successfully processed, the NCCDS shall notify the operator that the process is complete and provide the operator with all of the capabilities available at the completion of an operator-initiated batch scheduling run.
5.5.6.7 Scheduling Process, Automatic schedule updates, Wait List Processing, (b.) TSW updates are received	I	If wait list processing is enabled in semiautomatic mode and any requests were successfully processed, the NCCDS shall notify the operator that the process is complete and provide the operator with all of the capabilities available at the completion of an operator-initiated batch scheduling run. Refer to SRD paragraph 5.5.3.
5.6.3 Schedule Dissemination, Time Limit, (Except in manual mode)	A	In all other modes, the NCCDS shall alert the operator if an event is selected for transmission less than 5 minutes prior to its event start time.
5.6.6.1 Schedule Dissemination, Semiautomatic Mode Schedule, Transmission Rule Sets, (c.)	I	The NCCDS shall notify the operator whenever a particular combination of SIC, destination, and message type (refer to SRD paragraph 5.6.6.1a.2) is included in more than one active STRS
5.6.6.3 Schedule Dissemination, Alerts, (a.)	I	Any transmission is initiated in any mode.

Table C-1.a. Alerts for "SN Scheduling Analyst" Role

SRD Reference	Type	Description
5.6.6.3 Schedule Dissemination, Alerts, (b.)	A	Any transmission includes a currently inhibited combination of destination and spacecraft. Refer to SRD paragraph 5.6.6.6.
5.6.6.3 Schedule Dissemination, Alerts, (c.)	I	Any ground terminal transmission comes to a pause at the end of a transmission segment.
5.6.6.3 Schedule Dissemination, Alerts, (d.)	I	Any ground terminal transmission resumes after an intersegment pause.
5.6.6.3 Schedule Dissemination, Alerts, (e.)	I	Any transmission completes normally.
5.6.6.3 Schedule Dissemination, Alerts, (f.)	A	There is an acknowledgment failure for any message in any transmission.
5.6.6.3 Schedule Dissemination, Alerts, (g.)	A	Any schedule status message indicating any condition other than unqualified acceptance is received.
5.6.6.3 Schedule Dissemination, Alerts, (h.)	I	For an event, a schedule status message indicating unqualified acceptance is received after an earlier schedule status message from the same destination that did not indicate unqualified acceptance.
5.6.6.7 Schedule Dissemination, Free Text Messages and Printouts	A	Whenever any event is selected for transmission to a destination and transmission of a formatted message cannot be executed, the NCCDS shall alert the operator...

Table C-1.b. Alerts for "Acquisition Tracking Controller" Role

SRD Reference	Type	Description
6.3.3.2 Storage of New Vectors	I	If the earliest vector of a newly stored transmission has an epoch time less than or equal that of any vector for the same SIC previously stored in the primary area, the NCCDS shall move all such previously stored vectors to the secondary storage area. The NCCDS will also alert the operator.
6.3.4.4.1 Transmission of IIRV, Messages, Normal Throughput Mode Transmission	A	Except for maneuver sequences qualifying for real-time throughput mode transmission, the NCCDS shall then determine whether operator review (refer to SRD paragraph 6.3.7.1a.9) is required. If operator review is not required, the NCCDS shall immediately perform a normal transmission of any such vectors. If operator review is required, the NCCDS shall alert the operator and upon request provide the operator with a display of the vectors. The NCCDS shall then provide the operator with the option to either execute or cancel the transmission.
6.3.4.5 Transmission of IIRV, Messages, Spacecraft State Vector Rejection by WSGT and STGT	A	The NCCDS shall be capable of receiving Spacecraft State Vector Rejection OPMs from WSGT and STGT. The NCCDS will alert the operator upon receipt of any Spacecraft State Vector Rejection OPM.
6.3.6.3 Real-Time Mode Message	I	The NCCDS shall be capable of receiving Real-Time Mode OPMs from WSGT and STGT. The NCCDS will alert the operator upon receipt of any Real-Time Mode OPM.
6.3.7.2 Receipt of IIRV Messages, (a.)	I	The NCCDS shall alert the operator whenever an incoming IIRV message transmission terminates. (Refer to SRD paragraph 6.3.2.2.) The alert shall indicate the content of the transmission.
6.3.7.2 Receipt of IIRV Messages , (b.)	A	The NCCDS shall alert the operator whenever an invalid IIRV message or maneuver sequence is received. (Refer to SRD paragraphs 6.3.2.3 and 6.3.2.4.) The alert shall indicate the reason the IIRV message or maneuver sequence is invalid
6.3.7.3.3 Vector Storage, Alerts, (a.)	I	The NCCDS shall alert the operator whenever the earliest vector of a newly stored transmission has an epoch time less than or equal that of any vector for the same SIC previously stored in the primary area.
6.3.7.3.3 Vector Storage, Alerts, (b.)	I	Whenever vectors are moved from the secondary storage area to the primary storage area, the NCCDS shall alert the operator if the epoch time of any vector for the same SIC in the primary storage area is greater than or equal that of the earliest vector within the moved set and less than or equal that of the latest vector within the moved set.

Table C-1.b. Alerts for "Acquisition Tracking Controller" Role

SRD Reference	Type	Description
6.3.7.3.3 Vector Storage, Alerts, (c.)	I	Whenever epoch time adjustments (refer to SRD paragraph 6.3.3.5) are performed within the primary storage area, the NCCDS shall alert the operator if the epoch time of any vector for the same SIC in the primary storage area not selected for modification is greater than or equal that of the earliest vector within the modified set and less than or equal that of the latest vector within the modified set.
6.3.7.3.3 Vector Storage, Alerts, (d.1.)	I	As controlled by operator-specified parameters, the NCCDS shall periodically (refer to SRD paragraph 6.3.7.5e) audit the records of stored and transmitted vectors and alert the operator whenever for any SIC, the timespan covered by the vectors in the primary storage area is less than the operator-specified minimum. (Refer to SRD paragraph 6.3.7.5f.1.)
6.3.7.3.3 Vector Storage, Alerts, (d.2.)	I	As controlled by operator-specified parameters, the NCCDS shall periodically (refer to SRD paragraph 6.3.7.5e) audit the records of stored and transmitted vectors and alert the operator whenever for any SIC, the interval between epoch times of two consecutive vectors in the primary storage area is too large. (Refer to SRD paragraph 6.3.7.5f.2.)
6.3.7.3.3 Vector Storage, Alerts, (d.3.)	I	As controlled by operator-specified parameters, the NCCDS shall periodically (refer to SRD paragraph 6.3.7.5e) audit the records of stored and transmitted vectors and alert the operator whenever for any SIC, the timespan covered by the vectors transmitted to either of the ground terminals is less than the operator-specified minimum. (Refer to SRD paragraph 6.3.7.5f.3.)
6.3.7.3.3 Vector Storage, Alerts, (d.4.)	I	As controlled by operator-specified parameters, the NCCDS shall periodically (refer to SRD paragraph 6.3.7.5e) audit the records of stored and transmitted vectors and alert the operator whenever for any SIC, the interval between epoch times of two consecutive vectors transmitted to any ground terminal is too large. (Refer to SRD paragraph 6.3.7.5f.4.)
6.3.7.4.1 Transmission of Acquisition Data, Alerts, (a.)	I	The NCCDS shall alert the operator whenever any transmission is initiated in any mode.
6.3.7.4.1 Transmission of Acquisition Data, Alerts, (b.)	I	The NCCDS shall alert the operator whenever any transmission completes normally.
6.3.7.4.1 Transmission of Acquisition Data, Alerts, (c.)	A	The NCCDS shall alert the operator whenever there is an acknowledgment failure for any IIRV message in any transmission.

Table C-1.b. Alerts for "Acquisition Tracking Controller" Role

SRD Reference	Type	Description
6.3.7.4.1 Transmission of Acquisition Data, Alerts, (d)	A	The NCCDS shall alert the operator whenever a Spacecraft State Vector Rejection OPM is received.
6.3.7.4.1 Transmission of Acquisition Data, Alerts, (e.)	A	The NCCDS shall alert the operator whenever there is an indication of transmission failure for any Delta-T message transmission.
6.3.7.4.1 Transmission of Acquisition Data, Alerts, (f.)	A	The NCCDS shall alert the operator whenever a Delta-T Adjustment Rejection OPM is received.
6.3.7.4.1 Transmission of Acquisition Data, Alerts, (g.)	I	The NCCDS shall alert the operator whenever a Real-Time Mode OPM is received.

Table C-1.c. Alerts for "SN Performance Monitoring" Role

SRD Reference	Type	Description
5.8 Event Start/Stop Alerts, (a.)	A	At 5 minutes prior to the scheduled start time of each event, the NCCDS shall alert the operator. [Action alert if GT rejected the event, or SHO affected by SLR, or NASCOM reject] Also to SN Controller
5.8 Event Start/Stop Alerts, (a.)	I	At 5 minutes prior to the scheduled start time of each event, the NCCDS shall alert the operator. [Information alert if all normal] Also to SN Controller
5.8 Event Start/Stop Alerts, (b.)	I	At scheduled event stop time of events that were not terminated by the operator or customer, the NCCDS shall send an alert to the operator. Also to SN Controller
6.5.2.1 Performance Data Requests, Automatic Processing, (b.2.)	A	If the message fails validation, the NCCDS shall send an alert to the operator..
6.5.2.1 Performance Data Requests, Automatic Processing, (b.2.)	I	If the message does not fail validation, the NCCDS shall send an alert to the operator indicating that a valid User Performance Data Request has been received.
6.5.3.3 Validation of ODM Data, (b.2.)	A	If an ODM contains an invalid TDRS ID, within 5 seconds of receipt of the ODM the NCCDS shall send an alert to the operator.
6.5.3.3 Validation of ODM Data, (c.2.)	A	If an ODM contains a valid TDRS ID but invalid identification parameters for one or more services being reported, within 5 seconds of receipt of the ODM, the NCCDS shall send an alert to the operator.
7.1.1 Network Monitoring	A	*The values of certain performance parameters will be checked by the NCCDS. When a parameter fails these checks, the NCCDS will notify an operator, who will take action to identify the problem.*
7.2.2.1 Network Monitoring, Performance Data, General	A	*The NCCDS shall monitor all performance data received and alert the operator whenever an anomalous condition occurs* Also to SN Controller.
7.2.2.2 Network Monitoring, Performance Data, ODMs, (*b.) Monitoring ODMs.* (*1.*)	A	*If any 10-second interval elapses during which all of the expected ODMs for a given TDRS and group of services (i.e., SA/SMAR, MA/SMAF, or end-to-end test) are missing, within 5 seconds of* detection the NCCDS shall send an alert to the operator indicating that *ODMs are missing.*
7.2.2.2 Network Monitoring, Performance Data, ODMs, (*b.) Monitoring ODMs.* (*1.*)	A	*If any 10-second interval elapses during which all of the expected ODMs for a given TDRS and group of services are received, but the expected data for a particular service is missing from all of these* ODMs, within 5 seconds of detection the NCCDS shall send an alert to *the operator indicating missing data for that particular service.*

Table C-1.c. Alerts for "SN Performance Monitoring" Role

SRD Reference	Type	Description
7.2.2.2 Network Monitoring, Performance Data, ODMs, (*b.) Monitoring ODMs.* (*1.*)	I	*Within 5 seconds of resumption of receipt of ODMs following an outage condition, the NCCDS shall send an alert to the operator.*
7.2.2.2 Network Monitoring, Performance Data, ODMs, (*b.) Monitoring ODMs.* (*2.*)	A	*For each ODM parameter whose nominal value is specified by a SHO* or Reconfiguration Request OPM, the NCCDS shall compare the value received in the ODM to the value expected as indicated by the accepted SHO and/or Reconfiguration Request OPM. The comparison shall be *made at the start of each service and after implementation of each Reconfiguration Request OPM. Within 5 seconds of detecting a discrepancy, the NCCDS shall send an alert to the operator*
7.2.2.2 Network Monitoring, Performance Data, ODMs, (*c). ODM Limits Checks.* (*1.*)	A	*The parameter LINK STATUS is the key to limits processing of an ODM data packet (i.e., that portion of an ODM that pertains to a specific service). It has three admissible values: ACTIVE, PENDING, and ACQ/REACQ. When LINK STATUS indicates ACTIVE, the NCCDS shall perform the additional checks listed in SRD Table 7-1.* [Refer to SRD Note 7.2.2.2-1.] *If any of the checks fail, the NCCDS shall send an alert to an operator and log the ODM data packet.*
7.2.2.2 Network Monitoring, Performance Data, ODMs, (*c.) ODM Limits Checks.* (*2.*)	A	*When LINK STATUS indicates PENDING, the NCCDS shall send an alert to the operator and log the ODM data packet.*
7.2.2.2 Network Monitoring, Performance Data, ODMs, (*c.) ODM Limits Checks.* (*3.*)	A	When LINK STATUS indicates ACQ/REACQ, the NCCDS shall log the ODM data packet. When LINK STATUS indicates ACQ/REACQ for six *consecutive ODMs for a particular service, the NCCDS shall send an alert to the operator.*
7.3.1 Postevent Activities, Return Channel Time Delay Measurement	A	*The NCCDS shall send an alert to the operator whenever the requested Return Channel Time Delay Measurement message is not received within 2 minutes of service termination.*
7.3.2 Postevent Activities, Time Transfer	A	*The NCCDS shall send an alert to the operator whenever the requested Time Transfer message is not received within 1 minute of service termination.*

DRAFT   01/13/97

Table C-1.d. Alerts for "SN Controller" Role

SRD Reference	Type	Description
5.3.7 Schedule Messages, TDRSS Status	A	Upon receipt of an SLR, the NCCDS shall alert the operator and shall provide the operator with the following capabilities: (see SRD 5.3.7) Also SN Scheduling Analyst
5.8 Event Start/Stop Alerts, (a.)	A	At 5 minutes prior to the scheduled start time of each event, the NCCDS shall alert the operator. [Action alert if GT rejected the event, or SHO affected by SLR] Also to SN Performance Monitoring
5.8 Event Start/Stop Alerts, (a.)	I	At 5 minutes prior to the scheduled start time of each event, the NCCDS shall alert the operator. [Information alert if all normal] Also to SN Performance Monitoring
5.8 Event Start/Stop Alerts, (c.)		At scheduled event stop time of events that were not terminated by the operator or customer, the NCCDS shall alert the operator. Also to SN Performance Monitoring
5.8 Event Start/Stop Alerts, (d.)		When an ongoing event is deleted, the NCCDS shall alert the operator.
6.4.2.4 TDRSS-Unique GCMRs, Rejection by the NCCDS	A	For any operator -requested TDRSS-unique GCMR that is rejected, the NCCDS shall notify the originating operator that the GCMR has been rejected and indicate the reason for rejection.
6.4.2.7 TDRSS-Unique GCMRs, Operator Alerts, (a.)	I	The NCCDS shall present alerts the operator upon detection of the following condition: Receipt of a TDRSS-unique GCMR from a customer.
6.4.2.7 TDRSS-Unique GCMRs, Operator Alerts, (b.)	A	The NCCDS shall present alerts the operator upon detection of the following condition: Rejection by the NCCDS of a customer-requested TDRSS-unique GCMR.
6.4.2.7 TDRSS-Unique GCMRs, Operator Alerts, (*c*.)	I	The NCCDS shall present alerts the operator upon detection of the following condition: *Configuration update.*
6.4.2.7 TDRSS-Unique GCMRs, Operator Alerts, (d.)	A	The NCCDS shall present alerts the operator upon detection of the following condition: For reconfigurations initiated by the customer, failure to receive OPM status from WSGT or STGT within an operator-specified number of seconds after acknowledgment of the reconfiguration message.
6.4.2.7 TDRSS-Unique GCMRs, Operator Alerts, (e.)	A	The NCCDS shall present alerts the operator upon detection of the following condition: For reconfigurations initiated by the operator, failure to receive OPM status from WSGT or STGT within an operator-specified number of seconds after acknowledgment of the reconfiguration message.

NOPDRAP1.DOC   C-13   530-NOP-NCCDS/1998

Table C-1.d. Alerts for "SN Controller" Role

SRD Reference	Type	Description
6.4.2.7 TDRSS-Unique GCMRs, Operator Alerts, (f.)	A	The NCCDS shall present alerts the operator upon detection of the following condition: Receipt of OPM status indicating rejection.
6.4.3.3 User Reconfiguration GCMR, Rejection by the NCCDS	A	For any operator-requested User Reconfiguration GCMR that is rejected, the NCCDS shall notify the originating operator that the GCMR has been rejected and indicate the reason for rejection.
6.4.3.6 User Reconfiguration GCMR, Operator Alerts, (a.)	I	The NCCDS shall present alerts the operator upon detection of the following condition: Receipt of a User Reconfiguration GCMR from a customer.
6.4.3.6 User Reconfiguration GCMR, Operator Alerts, (b.)	A	The NCCDS shall present alerts the operator upon detection of the following condition: Rejection by the NCCDS of customer-requested User Reconfiguration GCMR.
6.4.3.6 User Reconfiguration GCMR, Operator Alerts, (c.)	A	The NCCDS shall present alerts the operator upon detection of the following condition: Transmission of reconfiguration messages involving reconfiguration of data rate, data stream ID, or Shuttle mode.
6.4.3.6 User Reconfiguration GCMR, Operator Alerts, (*d*.)	I	The NCCDS shall present alerts the operator upon detection of the following condition: *Configuration update.*
6.4.3.6 User Reconfiguration GCMR, Operator Alerts, (e.)	A	The NCCDS shall present alerts the operator upon detection of the following condition: For reconfigurations initiated by the customer, failure to receive status message from WSGT or STGT within an operator-specified number of seconds after acknowledgment of the reconfiguration message.
6.4.3.6 User Reconfiguration GCMR, Operator Alerts, (f.)	A	The NCCDS shall present alerts the operator upon detection of the following condition: For reconfigurations initiated by the operator, failure to receive status message from WSGT or STGT within an operator-specified number of seconds after acknowledgment of the reconfiguration message.
6.4.3.6 User Reconfiguration GCMR, Operator Alerts, (g.) (Deleted)	I	The NCCDS shall present alerts the operator upon detection of the following condition: Receive status message from Nascom CSS within 15 seconds of its acknowledgment of the reconfiguration message. (Deleted)
6.4.3.6 User Reconfiguration GCMR, Operator Alerts, (h.1.)	A	The NCCDS shall present alerts the operator upon detection of the following condition: Receipt of status message indicating rejection from WSGT.

Table C-1.d. Alerts for "SN Controller" Role

SRD Reference	Type	Description
6.4.3.6 User Reconfiguration GCMR, Operator Alerts, (h.2.)	A	The NCCDS shall present alerts the operator upon detection of the following condition: Receipt of status message indicating rejection from STGT.
6.4.3.6 User Reconfiguration GCMR, Operator Alerts, (h.3.) (Deleted)	A	The NCCDS shall present alerts the operator upon detection of the following condition: Receipt of status message indicating rejection from Nascom CSS. (Deleted)
6.4.5.2 OPM Status, Validation	A	The NCCDS shall perform validity checks on each OPM Status message to ensure that the referenced OPM ID, the referenced message class, and the problem code are valid. If the message fails a validity check, within 5 seconds of receipt of the rejection, the NCCDS shall send an alert to the operator.
6.4.6 Acquisition Failure Notification, (b.) Validation.	A	If the notice fails a validity check, within 5 seconds of receipt of the OPM, the NCCDS shall send an alert to the operator.
6.4.6 Acquisition Failure Notification, (b.) Validation.	A	If the notification is valid, within 10 seconds of receipt of the OPM, the NCCDS shall send an alert to an operator and forward the Acquisition Failure Notification to the customer.
7.2.2.1 Network Monitoring, Performance Data, General	A	*The NCCDS shall monitor all performance data received and alert the operator whenever an anomalous condition occurs.* Also to SN Performance Monitoring
7.2.2.2 Network Monitoring, Performance Data, ODMs, (*b.) Monitoring ODMs.* (*2.*)	A	*For each ODM parameter whose nominal value is specified by Reconfiguration Request OPM, the NCCDS shall compare the value* received in the ODM to the value expected as indicated by the accepted *Reconfiguration Request OPM. The comparison shall be made at the* start of each service and after implementation of each Reconfiguration *Request OPM. Within 5 seconds of detecting a discrepancy, the NCCDS shall send an alert to the operator*.

C 3 Access to NCCDS 98 from NCC 98 Operational Roles

The following Tables C-2.a to C-2.e present a preliminary identification of the NCCDS 98 functionalities provided by CCS and SPSR to each Operational Role and to the Operational Functions and Tasks within that role. Each Table presents the software support for the specific role indicated in the Table heading.

Each Table first column lists the Operational Functions and the related Tasks (see Appendix B for definition and reference code) corresponding to the Table Operational Role. The second column lists the Windows or GUIs used by the NCCDS 98 software for displaying information and for providing process control in support to each Operational Function and Task.

Table C-2.a. CCS Windows Supporting "SN Performance Monitoring"

Operational Functions and • Tasks	CCS-CSCI # and GUI Window and/or Icon
(2.2.4) Control SN Performance Data Dissemination to Customers:	CCS-CSCI 2306 Disseminate Performance Data
• Receive information alerts for valid UPDRs;	• Operator alert window and alert dialog
• Respond to action alerts for invalid UPDRs;	• Operator alert window and alert dialog
• Review active schedules and event services;	• CCS Review Events • CCS Event Services
• Enter UPDRs;	• CCS User Performance Data • CCS UPD Select Summary
• Review UPDR list;	• CCS User Performance Data • CCS UPD Select Summary
• Respond to action alerts for ODMs with invalid TDRS ID.	• Operator alert window and alert dialog
• Respond to action alerts for ODMs with invalid service identification parameters.	• Operator alert window and alert dialog
(2.3.1) Perform Network Monitoring and Identify Anomalies:	CCS-CSCI 3302 Monitor Performance Data; MMDPS/CCTV
• Review active schedules and event services;	• CCS Review Events • CCS Event Services
• Select TDRSs and review TDRS summaries of service status;	• CCS TDRS Summary Menu • CCS TDRS Summary
• Select TDRSs and review details of service status;	• CCS TDRS Summary Menu • CCS TDRS Summary • CCS ODM Display
• Respond to action alerts;	• Operator alert window and alert dialog
• Receive alerts relative to impending start and end of each event;	• Operator alert window and alert dialog
• Track SLRs;	• CCS Review Events
• Issue communication test messages and review network site status;	• CCS Communication Test Block • CCS Network Site Status
• Review ODM data;	• CCS TDRS Summary Menu • CCS TDRS Summary • CCS ODM Display
• Perform anomaly identification and recovery.	• MMDPS GUIs
(2.3.2) Perform Post-Event Problem Analysis:	CCS-CSCI 2306 Disseminate Performance Data; MMDPS/CCTV
• Review event services;	• CCS Review Events • CCS Event Services

Table C-2.a. CCS Windows Supporting "SN Performance Monitoring"

Operational Functions and • Tasks	CCS-CSCI # and GUI Window and/or Icon
• Select TDRSs and review TDRS summaries of service status;	• CCS TDRS Summary Menu • CCS TDRS Summary
• Select TDRSs and review details of service status;	• CCS TDRS Summary Menu • CCS TDRS Summary • CCS ODM Display
• Respond to action alerts;	• Operator alert window and alert dialog
• Review Return Channel Time Delay and Time Transfer message data;	• CCS ODM Display
• Perform anomaly identification and recovery.	• MMDPS GUIs
(2.3.3) Evaluate RFI and Mutual Interference Prediction:	ACRS/TLAS
• Set evaluation and simulation parameters;	• ACRS/TLAS GUIs
• Evaluate results and coordinate request editing with customer.	• ACRS/TLAS GUIs

Table C-2.b. CCS Windows Supporting "SN Controller" Role

Operational Functions and • Tasks	CCS-CSCI # and GUI Window and/or Icon
(2.2.3) Control Service Reconfiguration Requests:	CCS-CSCI 2305 Reconfigure Ongoing Services
• Receive information alerts for valid GCMRs;	• Operator alert window and alert dialog
• Respond to action alerts related to invalid or NCCDS rejected GCMRs;	• Operator alert window and alert dialog
• Resolve inconsistencies in User Reconfiguration GCMRs;	• CCS GCM Menu (Active Services) • CCS Specific Service Reconfiguration
• Review active schedules and event services;	• CCS GCM Menu (Active Services)
• Review current configuration of ongoing services;	• CCS GCM Menu (Active Services) • CCS Specific Service Reconfiguration
• Enter TDRSS-unique and user reconfiguration requests;	• CCS Specific Service Reconfiguration
• Respond to action alerts related to invalid OPMs;	• CCS Reconfiguration OPM Status Time-out
• Respond to action alerts related to GT or Nascom status messages indicating rejection;	• Operator alert window and alert dialog
• Respond to Acquisition Failure Notification.	• CCS ODM Display

Table C-2.c. SPSR Windows Supporting "Acquisition Tracking Controller" Role

Operational Functions and • Tasks	GUI Window and/or Icon
(2.2.2) Control Acquisition Data Reception and Dissemination:	
• Respond to alerts relative to end of incoming vector transmission and to reception of maneuver sequence;	• Operator alert window and alert dialog
• Respond to alerts relative to invalid vectors;	• Operator alert window and alert dialog
• Set vector retention parameters;	• Vector transmission control parameters window
• Review received and stored vectors;	• System vectors window, vector editor
• Shift epoch time of vectors;	• Vector editor
• Enter, copy, edit, and delete vectors;	• System vectors window, vector editor
• Move vectors between primary and secondary storage;	• Vector editor
• Respond to GT administrative message requests relative to TDRS maneuvers;	• E-Mail
• Define Vector Transmission Rule Sets (VTRS) and transmission control parameters;	• Vector transmission rule set window and vector details
• Review and modify transmission content;	• Vector transmission window, vector details window, vector transmission ???
• Execute manual mode transmission;	• Vector transmission window, Vector transmission rule set window
• Execute, delay, cancel a semi-automatic mode transmission;	• Vector transmission window
• Execute, cancel a normal throughput mode transmission;	• Vector transmission window
• Monitor transmission progress;	• Vector transmission status window
• Respond to alerts relative to rejected state vectors;	• Operator alert window and alert dialog
• Transmit free-text or hard-copy messages when needed;	• E-Mail
• Terminate or inhibit transmission.	• Vector transmission status window, inhibit/enable transmission window

Table C-2.d. SPSR Windows Supporting "SN Scheduling Analyst" Role

Operational Functions and • Tasks	GUI Window and/or Icon
(2.1.2) Interact with Schedule Related Messages:	
• Respond to alerts for invalid customers requests;	• Operator alert window and alert dialog
• Respond to GT requests (GAMs) for scheduling SN resources;	• E-Mail
• Update SN resources availability in the SN database according to accepted GT requests;	• SGLT resource availability window, GT configuration window
• Monitor SLRs;	• SLR summary window
• Update SN resources availability in the SN database according to SLR content;	• SGLT resource availability window, GT configuration window
• Manage TSWs;	• TSW sets window
• Enter, update, copy, and delete schedule related messages used for service scheduling.	• Schedule request window, SAR editor, Wait list editor, delete editor
(2.1.3) Control the Scheduling Process:	
• Define boundary between automatic and batch scheduling;	• Schedule Control Window
• Define alert period for automatic updates to schedule;	• Schedule Control Window
• Define alert period for reception of customer requests;	• Schedule Control Window
• Select input for batch schedule;	• Schedule Control Window
• Manage, review, and update scheduling priority lists;	• Schedule priority list window
• Start batch schedule generation;	• Schedule generation window
• Evaluate batch schedules and perform conflict resolution;	• Batch schedule window, conflict information window
• Activate schedule, freeze schedule, and review wait lists;	• Batch schedule window, active schedule window
• Control wait lists processing;	• Schedule control window
• Control automatic schedule generation;	• Schedule control window
• Coordinate request editing with customer.	• Schedule request window, SAR editor, Wait list editor, delete editor • E-Mail
(2.1.4) Control TDRSS Unscheduled Time (TUT) Generation and Distribution:	
• Specify period and time of day for generating TUT information;	• Schedule control window
• Initiate generation of TUT information;	• TDRS unscheduled time window

Table C-2.d. SPSR Windows Supporting "SN Scheduling Analyst" Role

Operational Functions and • Tasks	GUI Window and/or Icon
(2.2.1) Control Dissemination of Service Schedules and Updates:	
• Define Schedule Transmission Rule Sets (STRS);	• Schedule Transmission Rule Sets Window • STRS details window
• Define transmission segment control parameters;	• Schedule transmission window
• Respond to prompt for activated schedule initial transmission (USMs and SRMs);	• Schedule transmission window
• Review and modify transmission content;	• Schedule transmission window
• Review and select transmission destination;	• Schedule transmission window
• Control semi-automatic mode transmission execution;	• Schedule transmission window
• Execute manual transmission when needed;	• Schedule transmission window
• Monitor transmission progress;	• Schedule transmission status window
• Respond to alerts relative to schedule status messages from GT and Nascom;	• Operator alerts window, alerts dialog
• Transmit free-text or hard-copy messages when needed;	• E-Mail
• Terminate or inhibit transmission.	• Schedule transmission status window • Transmission inhibit/ enable window

Table C-2.e. SPSR Windows Supporting "Service Planning Database Analyst" Role

Operational Functions and • Tasks	GUI Window and/or Icon
(2.1.1) Maintain the Service Planning Database:	
Define and maintain the Space Network database:	
• TDRS names, assignments of TDRS to SGLT, and TDRS resources availability,	• TDRS configuration window • TDRS resources characteristics window
• Ground terminal names, SGLT, and resources availability,	• GT configuration • SGLT resource availability window
• MDM and HDRM bandwidth capacities and parameters,	• MDM capacities window • HDRM capacities window
• User interface channels and port addresses;	• User interface channels window • Update user interface channels window
Define and maintain the Customer database:	
• General customer parameter,	• Customer DB main window • SIC main window.
• Level of support,	• Level of support window
• Service parameter valid values,	• <xxx> valid window, where <xxx> is service type
• Service specification codes (SSC),	• Customer services window
• DQM setup parameters,	• DQM parameters window
• Nascom parameters,	• NASCOM parameters window
• Prototype events,	• Prototype events window, service editor
• User IDs and passwords;	• Customer information window
Define and maintain the event scheduling control database:	
• Mission priorities list,	• Mission priorities list window
• TDRS sets,	• TDRS sets window
• SA antenna slew time,	• Schedule control window (to be confirmed)
• Time-dependent data retention criteria,	• Purge control window
• Scheduling priority lists,	• Schedule priority lists window
• Batch and automatic scheduling boundary,	• Schedule control window
• Alert period for automatic updates to schedule,	• Schedule control window
• Alert period for reception of customer requests.	• Schedule control window